SERVICE MANUAL

AKAI TAPE RECORDER

MODEL GX-220

ALSO APPLICABLE TO MODEL **GX-220D**

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When placing order for parts, please use Separate PARTS LIST or PRICE LIST FOR PARTS.

I. SPECIFICATIONS

STYLE : Portable
WEIGHT : GX-220 48.8 lbs. (22.2 kg)
GX-220D 41.8 lbs. (19 kg)
DIMENSIONS : 17.2" (W) x 17" (H) x 9.2" (D)
(430 x 425 x 230 mm)
POWER SUPPLY : AC 100 to 240 V, 50/60 Hz
RECORDING SYSTEM
: In-line 4-track stereo, monaural GX-Head playback System.
PLAYBACK SYSTEM
: In-line 4-track stereo, monaural GX-Head Playback System.
TAPE SPEED : 1-7/8, 3-3/4 and 7-1/2 ips.
TAPE SPEED DEVIATION
: Within ±0.7%
WOW AND FLUTTER
(Playback only) : Less than 0.1% r.m.s. at 7-1/2 ips.
Less than 0.2% r.m.s. at 3-3/4 ips.
Less than 0.3% r.m.s. at 1-7/8 ips.
FREQUENCY RESPONSE
: 30 to 24,000 Hz ±3 dB at 7-1/2 ips.
30 to 18,000 Hz ±3 dB at 3-3/4 ips.
40 to 9,000 Hz ±4 dB at 1-7/8 ips.
SIGNAL TO NOISE RATIO
: Better than 48 dB (Forward Operation)
Better than 45 dB (Reverse Operation)
DISTORTION : Within 2% at Line Output, 1,000 Hz 0 VU
0 VU Recording and Playback.
CROSS TALK : Less than −65 dB (Monaural)
Less than −43 dB (Stereo)
ERASE RATIO : Less than −70 dB
INSULATION RESISTANCE
: More than 50 M Ohms
INSULATION DURABILITY
: 500 V. AC for more than one minute duration.
POWER OUTPUT : (8Ω Speaker) more than 10 W.
LINE OUTPUT : Required load impedance more than 20 K Ohms.
1.23 V (+4 dBs)
DIN OUTPUT : 0.4 V
Required Load Impedance more than 50 K Ohms.
LINE INPUT : Above 50 mV (−25 dBs)
Impedance ..... 150 K Ohms.
DIN INPUT : High .....Above 50 mV (−25 dBs).
Impedance ..... 150 K Ohms.
Low .....Above 5 mV (−45 dBs).
Impedance ..... 27 K Ohms.
MIC. INPUT : Above 0.2 mV
Impedance ..... 10 K Ohms.
FAST FORWARD AND REWIND TIME
: 85 seconds for a full 1,200 foot tape at 50 Hz.
65 seconds for a full 1,200 foot tape at 60 Hz.

SPEAKER : 4" round type 8 Ω 1.5 W
(GX-220 only)
MOTORS
CAPSTAN MOTOR
: Hysteresis Synchronous 3-speed (2-4-8 pole) motor
Condenser Capacity 3 μF (50 Hz)
2 μF (60 Hz)
Revolutions : 3,000−1,500−750 r.p.m. (50 Hz)
3,600−1,800−900 r.p.m. (60 Hz)
REEL MOTOR
: Two 6-pole eddy current outer-rotor motors.
Revolutions : 930 r.p.m. at 50 Hz 100 V
1,120 r.p.m. at 60 Hz 110 V
HEADS
REC. HEAD
(Interchangeable with Models GX-365 and GX-280D).
: In-line 4-track stereo and monaural Glass and Crystal Ferrite Head.
Impedance ..... 15 Ohms at 1,000 Hz.
Gap .....4/1,000 mm
ERASE HEAD
(Interchangeable with Models 1730-SS and GX-280D). : In-line 4-track stereo/monaural.
Impedance .....300 Ohms at 100 KHz.
Gap .....0.4 mm
PLAYBACK HEAD
(Interchangeeable with Models GX-365 and GX-280D)
: In-line 4-track stereo/monaural Glass and Crystal Ferrite Head.
Impedance ... 2,500 Ohms at 100 KHz.
Gap ..... 2/1,000 mm
RECORDING LEVEL INDICATOR
: Two VU Meters.
IC USED : 2 STK-015 (GX-220 only)
TRANSISTORS USED
: 12 2SC871 (F) 2 2SC971 (2, 3)
6 2SC945 (Q, R) 1 2SC1211 (C, D)
1 2SC372
2 LD-3141 1 2SD205
DIODES USED : 6 IN34A
1 10D4 15B2 (GX-220 only)
5 10D1 1 RD24A (M)
REELS USED : 7", 5", 3" reels

II. MEASURING METHOD

TAPE SPEED DEVIATION

1. Method involving use of pre-recorded tape
   Playback tape pre-recorded at 1000 Hz (±0.1%) on recorder to be tested. Connect the appropriate output to a frequency counter meter in order to measure the tape speed deviation.
2. Method involving use of timing tape. (designed for tape speed measurement)
   This method utilizes a timing tape marked at intervals of 7-1/2″. The running time of over 60 marked sections of tape is measured in order to calculate the deviation of the tape speed. In applying this method, however, it should be kept in mind that timing tape stretch or contract measurement error is inevitable, so that it is necessary to measure the total length of the tape in advance.

WOW AND FLUTTER

Playback a 3,000 Hz pre-recorded tape, of which the wow and flutter level is guaranteed to be smaller than 0.07%, and measure with a wow meter. It is also possible for a 3,000 Hz sine wave to be recorded and played back for measurement with a wow meter. In this case, however, the wow meter will indicate a value as much as twice that given in the specifications.

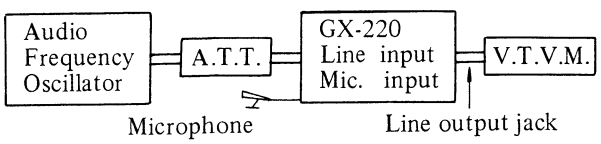
FREQUENCY RESPONSE

RECORD :

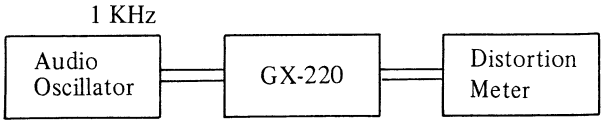
1) Supply a sine wave of 1,000 Hz to the Line Input of the recorder to be tested through an attenuator from an audio frequency generator.
2) Set the Record/Playback Lever to "Rec" position and adjust the line input volume so that the VU Meter needle indicates "0" VU.
3) Set the Equalizer Switch to 7-1/2″ or 3-3/4″ position.
4) Under the condition described in (2), lower the input level 16 dB by means of the attenuator.
5) Record the spot frequency in the range of 30 Hz to 25,000 Hz from the audio frequency generator.

PLAYBACK :

6) Set the Record/Playback Lever to "Play" position.
7) Connect a Vacuum Tube Volt Meter to the Line Output Jack. (VTVM with milli volt scale.)
8) Playback the recorded tape.
9) Playback the recorded spot frequencies and make a memo of output level and plot the value on a graph.



TOTAL HARMONIC DISTORTION FACTOR



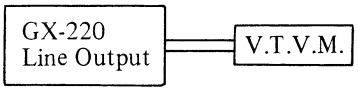
Connect the measuring instrument as shown above, and record the 1,000 Hz sine wave at "0" VU. Playback the resulting signal and measure the overall distortion factor. Measure the noise level of the tape recorder with the tape removed ; connect the audio oscillator directly to the distortion meter for measurement of the distortion factor of the oscillator.
The required distortion factor can be obtained from the results of the above measurement by the following formula :

$$d_0 = d - d_1 - d_2$$

where, d_0 = Required
d = Overall distortion factor
d_1 = Noise level
d_2 = Distortion factor of the oscillator

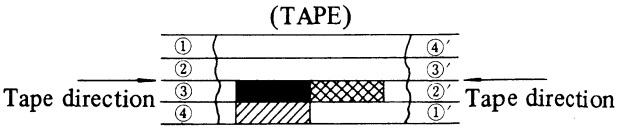
(Note : New tape of particularly good quality should be used for measurement of the distortion factor.)

SIGNAL TO NOISE RATIO



Set the Equalizer Switch to "7-1/2 ips" position and playback a tape containing a 250 Hz sine wave recorded at "0" VU level on a standard recorder. Connect a V.T.V.M. to the line output jack of the recorder and measure its output. Then remove the tape and measure the noise level under the same condition. Convert into decibels each of the measured values.

CROSSTALK (Crosstalk between the tracks)

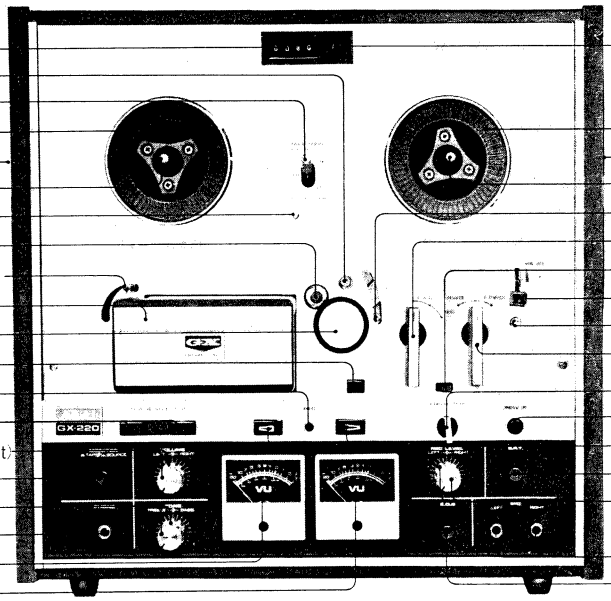


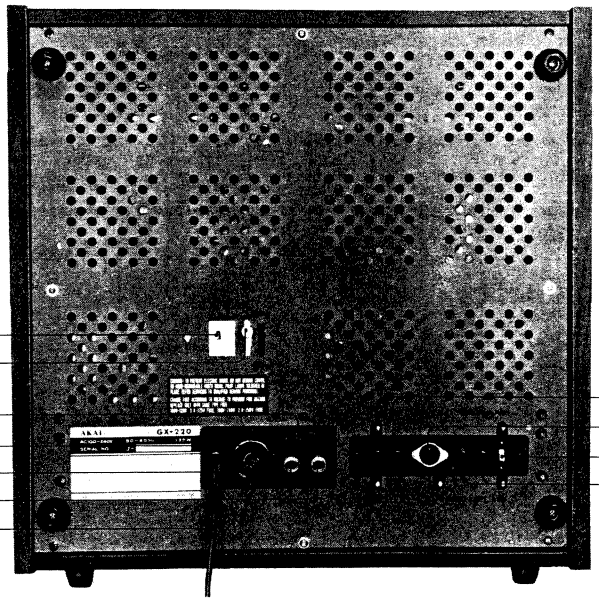
As shown in the figure, first record a 1,000 Hz sine wave on track No. 3 at +3 VU level. Next, remove the 1,000 Hz input signal and record under a non-input condition. Then, playback the tape on track No. 3 and No. 1 (reversed condition of tape) through the 1,000 Hz B.P.F. (Band Pass Filter, Sensitivity . . . 1 : 1) and obtain a ratio between the two from the following formula.

$$C = 20 \log \frac{E_0}{E_2 - E_1} \quad (dB)$$

C = Desired crosstalk ratio (dB)
E_0 = 1,000 Hz signal output level
E_2 = 1,000 Hz crosstalk output level
E_1 = Non-input signal record level

III. CONTROL LOCATIONS



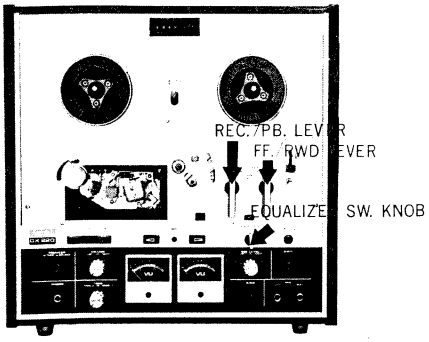


IV. DISMANTLING OF TAPE TRANSPORT UNIT & AMPLIFIERS

In case of trouble, etc. necessitating disassembly, please disassemble in the order shown in photographs. Reassemble in reverse order.

1

2



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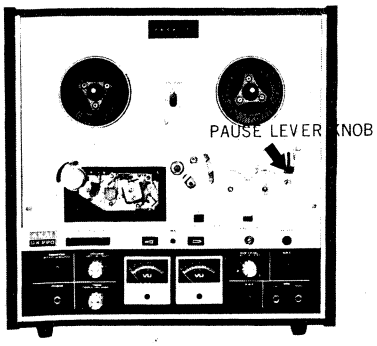

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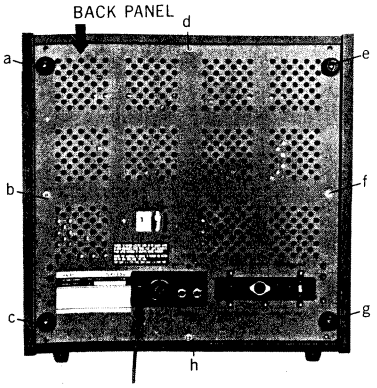

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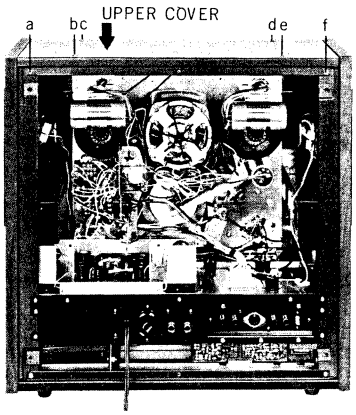

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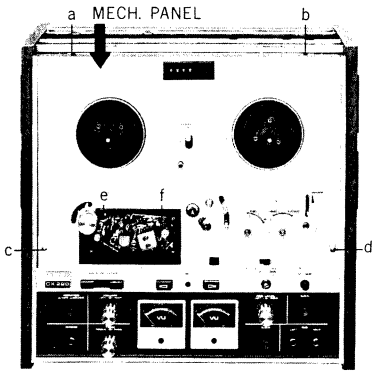

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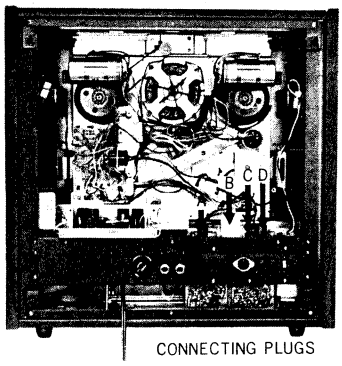

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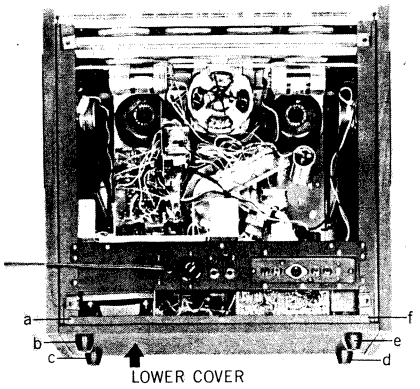

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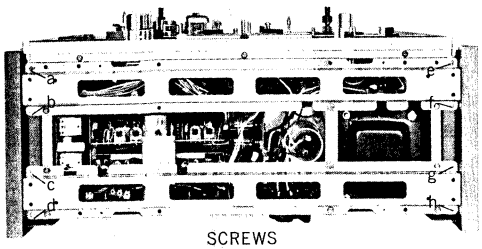

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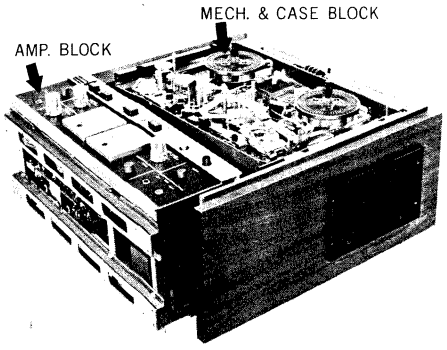

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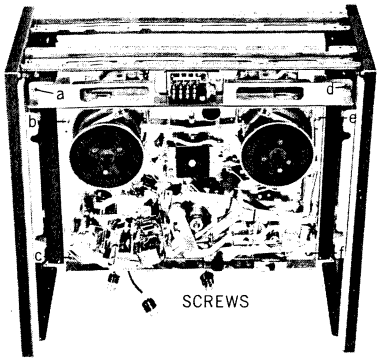

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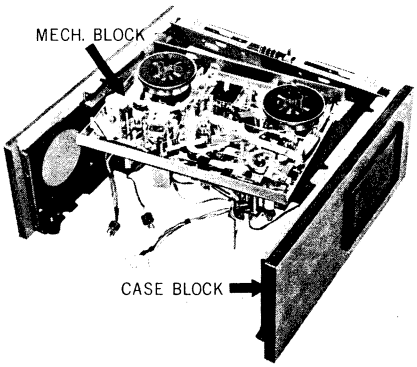

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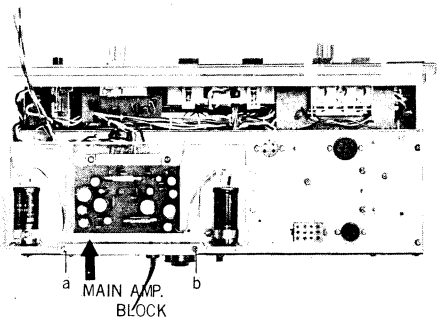

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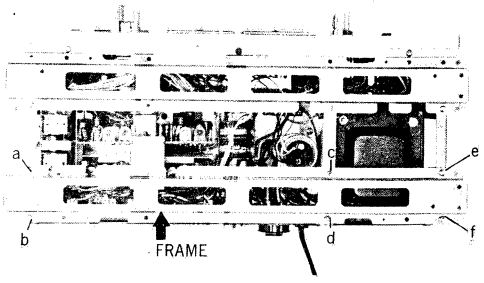

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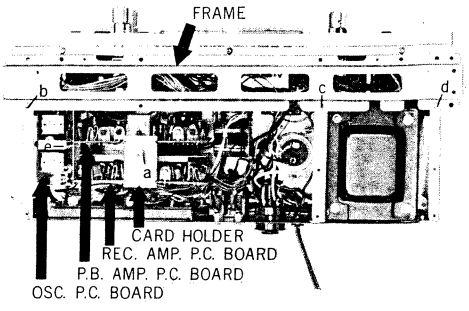


V. TRANSPORT MECHANISM

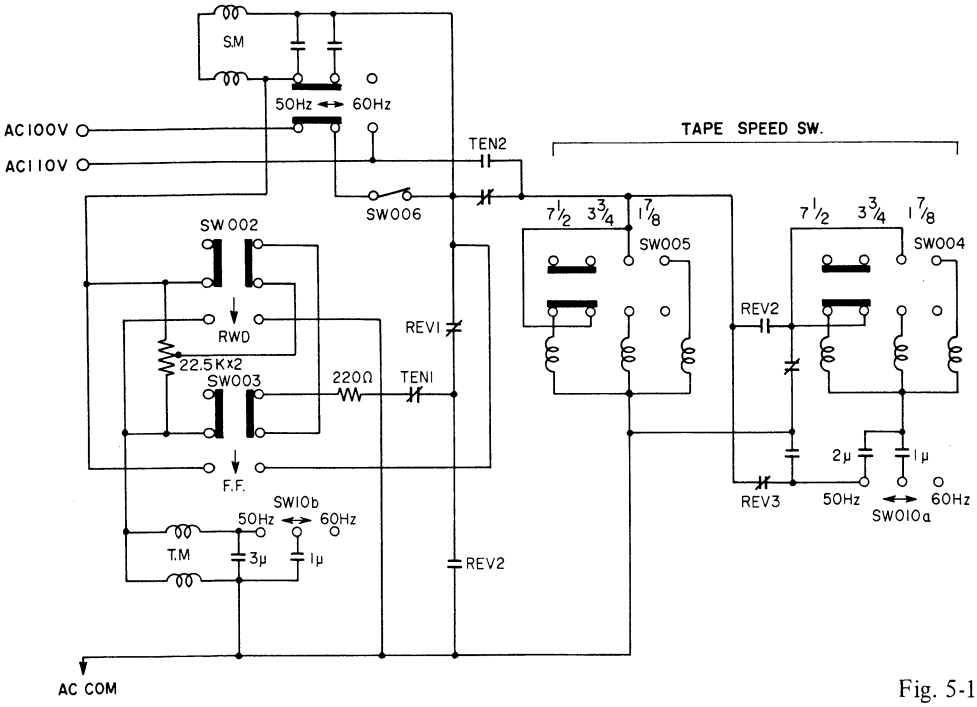
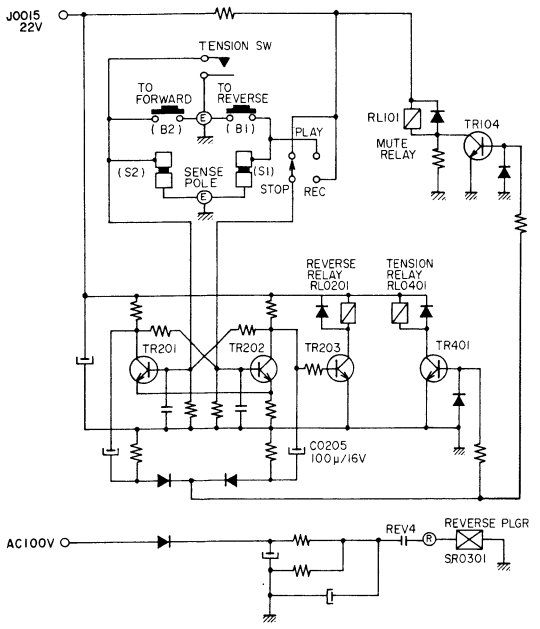


Fig. 5-1



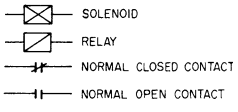


Fig. 5-2

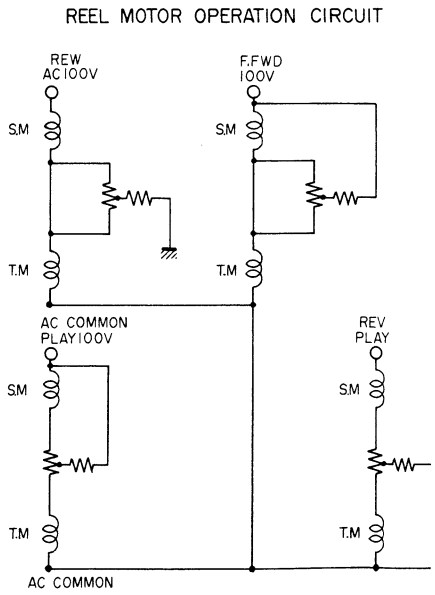


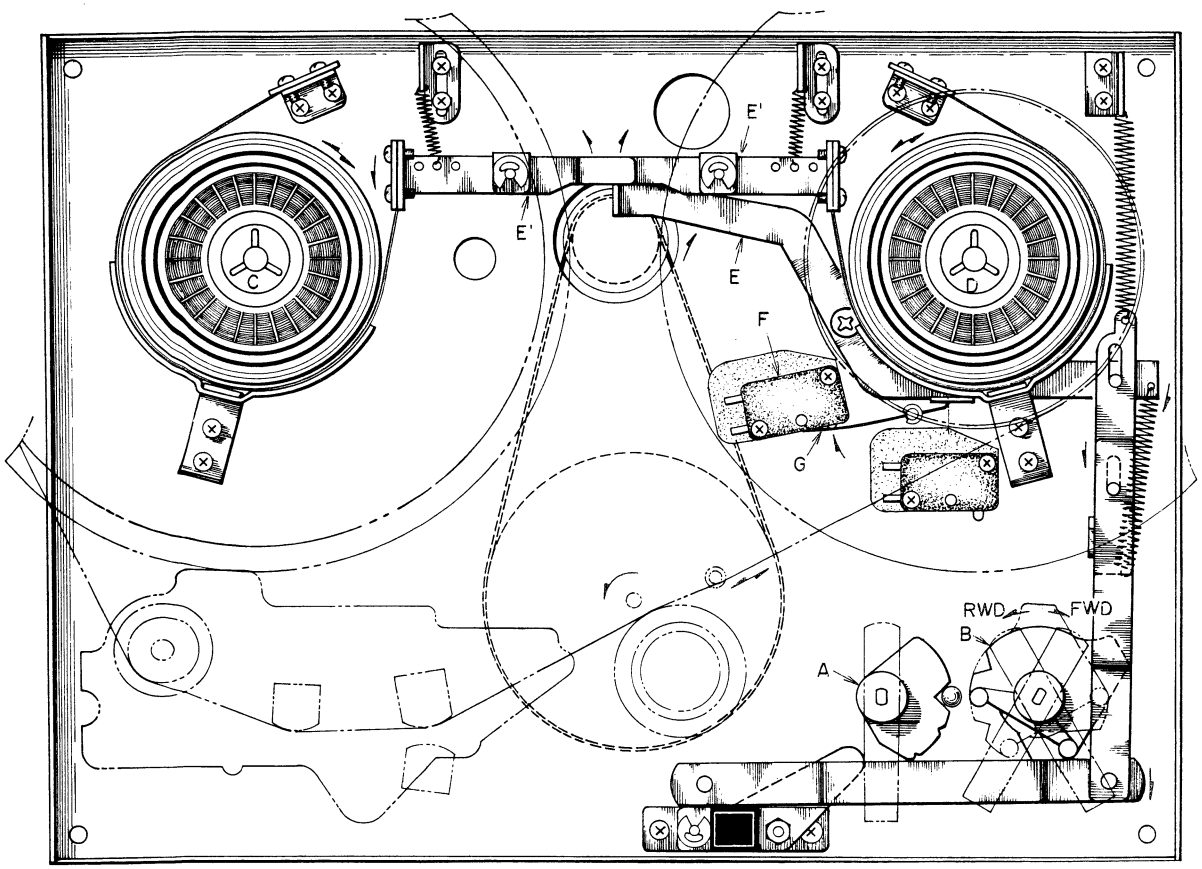
Fig. 5-3

1. SUPPLY VOLTAGE OF BOTH TORQUE MOTORS DURING RECORDING/PLAYBACK

	SUPPLY	TAKE-UP
Normal Play	30 V (50 to 60 gr)	60 V (180 gr)
First 4 to 8 sec. of reverse	47 V (100 gr)	47 V (100 gr)
Reverse	60 V (180 gr)	30 V (50 to 60 gr)
RW-FF	100 V	100 V

2. PINCH ROLLER PRESSURE 1.5 Kgr TO 1.8 Kgr.

Recording/Playback (Normal Recording)
Set Recording/Playback Lever (A) to Playback Position. The Pinch Roller presses against Capstan to move the tape at the rated speed. The Brake Levers free the Brake and Lever Spring (G) turns "ON" Microswitch (SW006) (F) so that both torque motors become operative (as shown in diagram illustration).



FAST-FORWARD/REWIND

Fig. 5-4

3. REVERSE (BLOCK DIAGRAM ILLUSTRATION)

During Playback mode, when Reverse button (B) is depressed or the sensing tape passes the sensing pole (S_1), the base of TR0202 is grounded. The operation of TR0202 is stopped and the voltage sent to the base of TR0203 and operates it. Reverse Relay RL0201 is actuated and Reverse is effected.

At the same time, the discharge current of Condenser C0205 (100 M/16 V) actuates TR0401 and TR104 which assume operating position within a period of from 4 to 8 seconds.

Tension Relay (RL0401) is actuated and a higher voltage than during reverse playback time (47 V) is supplied to the Take-Up torque motor. At the same time Mute Relay (CRL1017) mutes the playback output signal.

Plunger (SR0301) operates and lowers the playback head. (See Fig. 5-4)

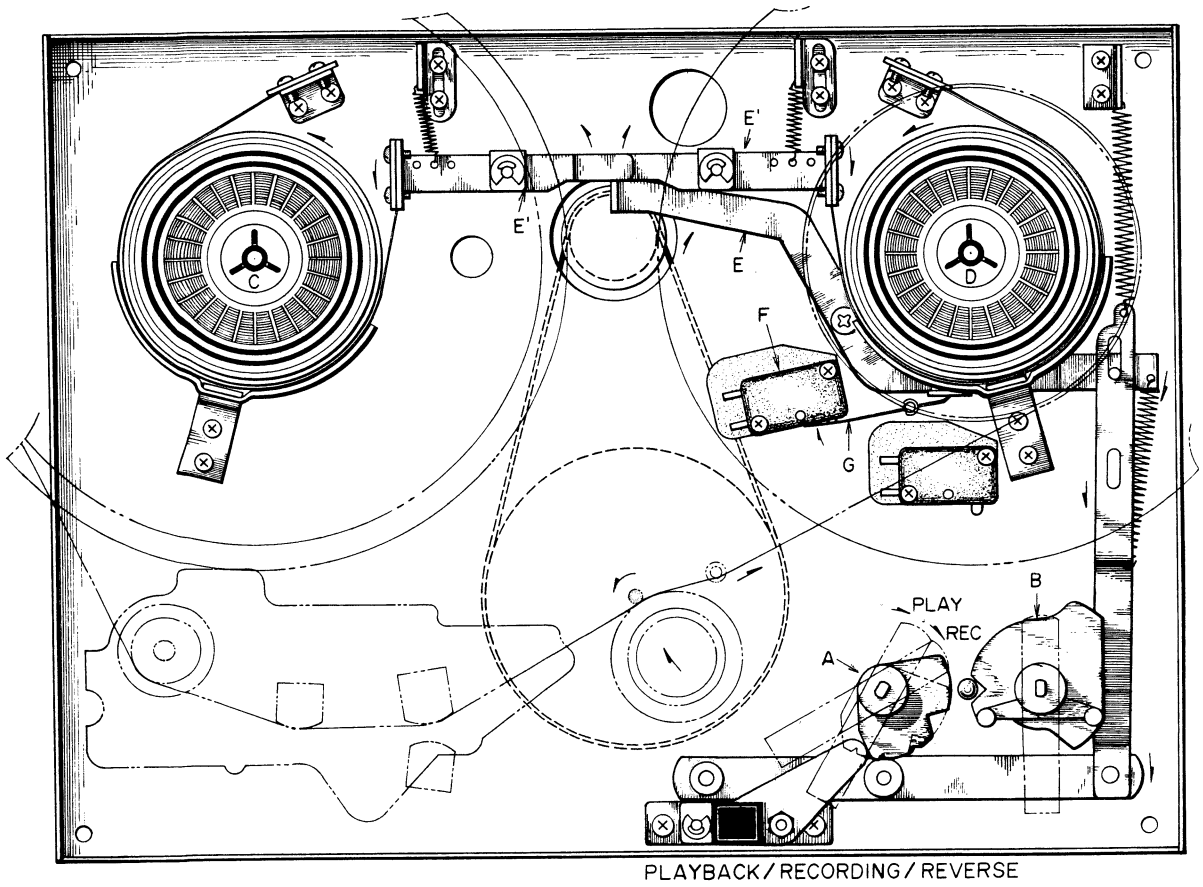


Fig. 5-5

4. FAST FORWARD

When Fast Forward/Rewind Lever is set to Forward position, SW003 (block diagram) enters forward position. Brake Levers (E) (E) free brake. Lever Spring (G) turns "ON" Microswitch (F) and the TAKE-UP Torque Motor rotates. (See Fig. 5-5)

5. REWIND

When Fast Forward/Rewind Knob is set to Rewind position, SW002 (block diagram) enters rewind position. Brake Levers (E) (E) free Brake. Lever Spring (G) turns "ON" Microswitch (F) and the SUPPLY Torque Motor rotates. (See Fig. 5-5)

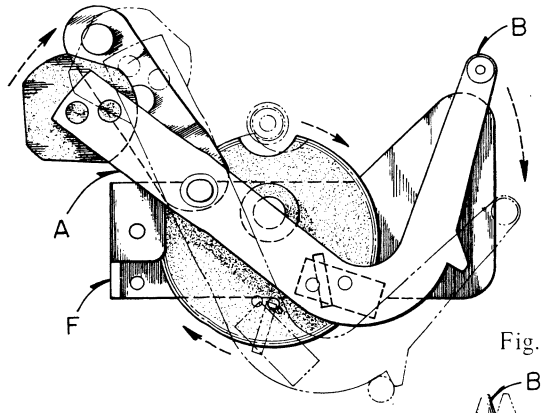


Fig. 5-6

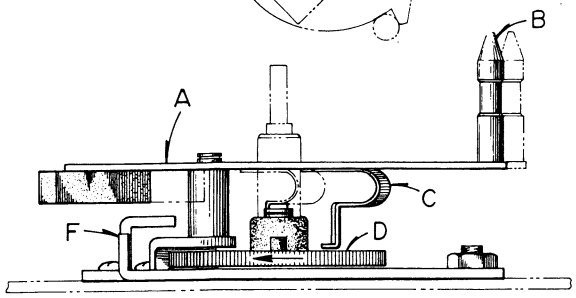


Fig. 5-7

AUTOMATIC STOP MECHANISM

When the tape is threaded on pin (B), if the tape is accidentally broken or comes to the end, Automatic Stop Lever (A) drops to its original position.

When the tape is broken or comes to the end, Plate Spring (C), located below the Automatic Stop Lever, depresses a projected pin on Eccentric Gear (D). Eccentric Gear (D) gears into Flywheel (E) to begin rotation of the Eccentric Gear. This rotating action operates Lever (L), which is connected to the base of the Eccentric Gear, and pushes up Instant Stop Lever (G). When Instant Stop Lever (G) is lifted, Shut-Off Lever (J) contacts Micro Switch (K) and the current supply is cut off. Thus, automatic stop control is provided in Recording and Playback modes.

In Fast Forward and Rewind modes, the same operation takes place except that Lever (H) works to push back the FF, Rewind Shaft to "Stop" position.

(See Figs. 5-6 to 5-9)

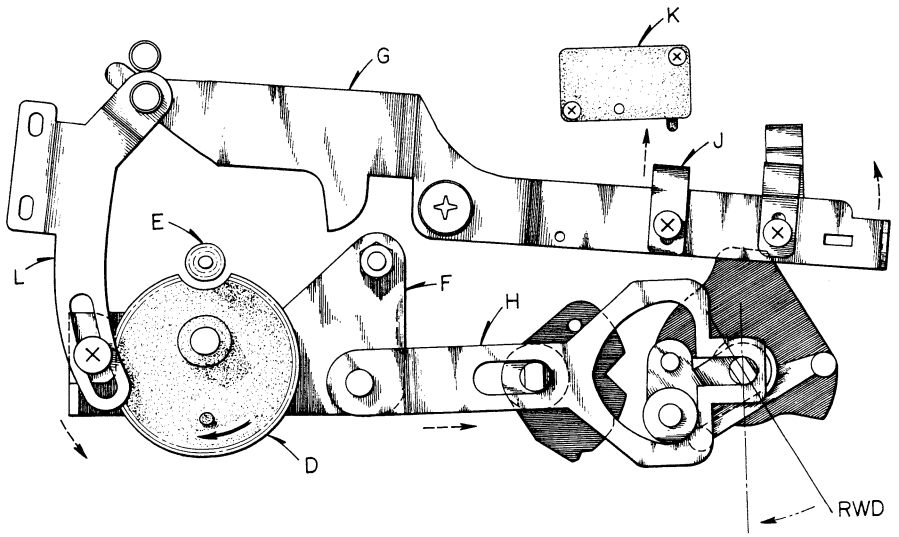


Fig. 5-8

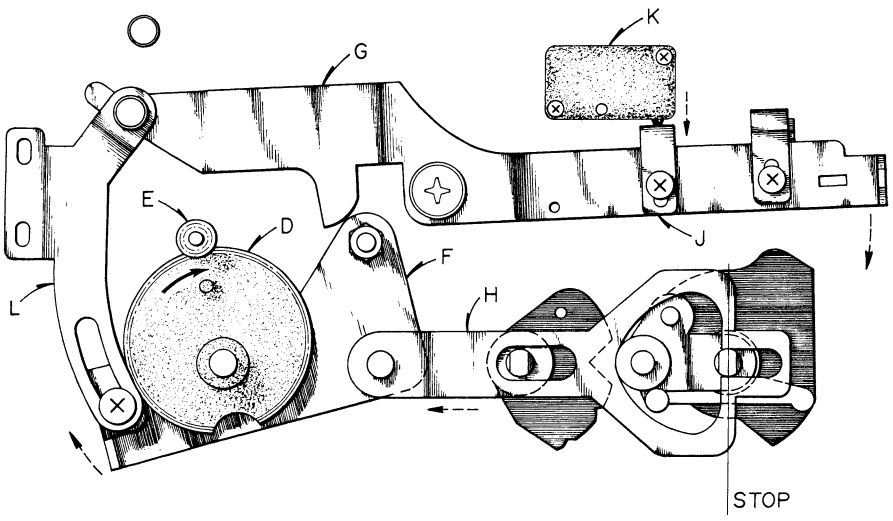


Fig. 5-9

VI. MECHANISM ADJUSTMENT

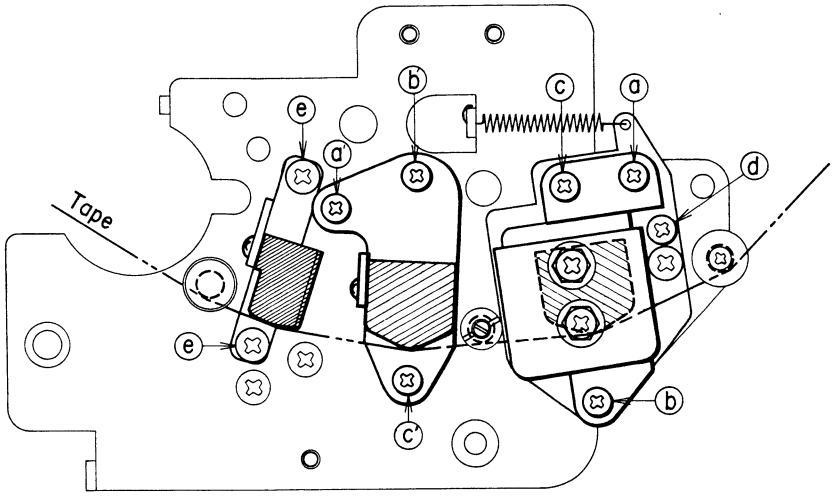


Fig. 6-1

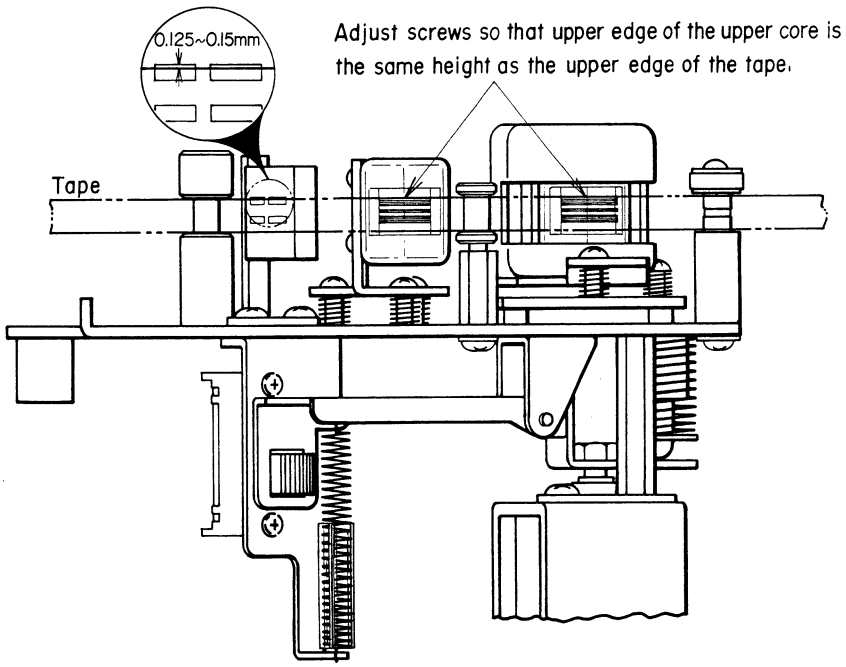


Fig. 6-2

1. ADJUSTMENT OF HEAD HEIGHT (See Figures 6-2 and 6-3).

1) During Normal Play, adjust screws (a') (b') (c') (Fig. 6-1) so that the upper edge of the upper core of the Playback and Recording Head is the same height as the upper edge of the tape.
During Reverse Play, adjust screw (d) (Fig. 6-1) so that the lower edge of the lower core is the same height as the lower edge of the tape.

2) Erase Head
The upper edge of the upper core is 0.125 to 0.15 mm higher than the upper edge of the tape. The front of the head should be at right angles to the chassis and the upper and lower part of the head should firmly contact the tape.

2. ADJUSTMENT OF AZIMUTH ALIGNMENT

1) Playback Head
Use a pre-recorded tape (16 kHz, 7-1/2 ips) and connect a high sensitivity V.T.V.M. to the the line output jack. Adjust screws (a) (b) so that the line output voltage is maximum and the output error between left and right channel is within 2 dB. This 2 dB margin should be maintained during normal reverse (both directions).

2) Recording Head
After the above adjustments have been made, at 7-1/2 ips speed, supply a 15 KC–10 dB signal from the Line and adjust screw (a') so that this output is maximum.

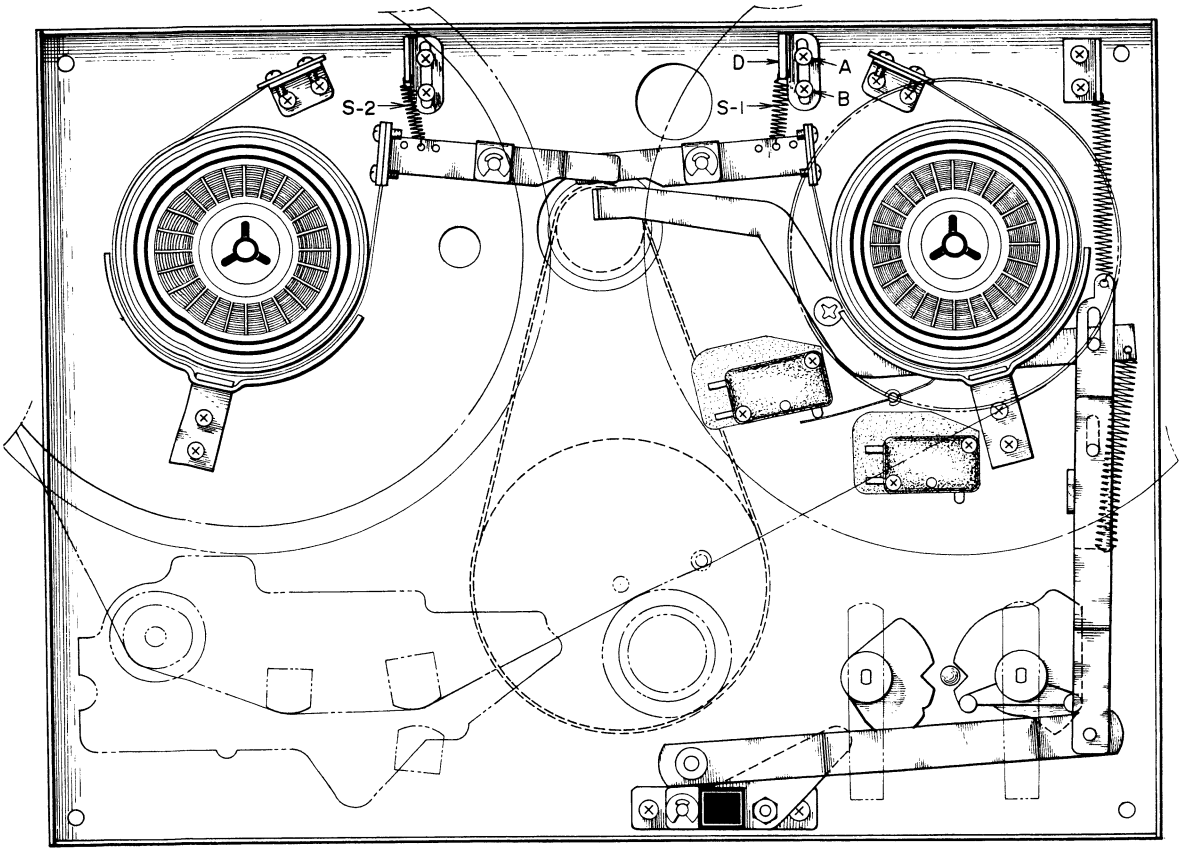


Fig. 6-3

BRAKE ADJUSTMENT

Using a Tension Gauge, and a 60 mm tape wound on a 5" Reel, measuring can be accomplished as per drawing. Measure the brake tension as shown in the drawing. 300 gr is standard.

To regulate tension, change the position of the suspended springs (S_1 and S_2 in Fig. 6-3) or loosen screws (A) (B) and regulate position of the spring suspension metal fitting (D).

REEL HEIGHT ADJUSTMENT (SEE DIAGRAM ILLUSTRATION)

Loosen Reel Table Screws and regulate height.

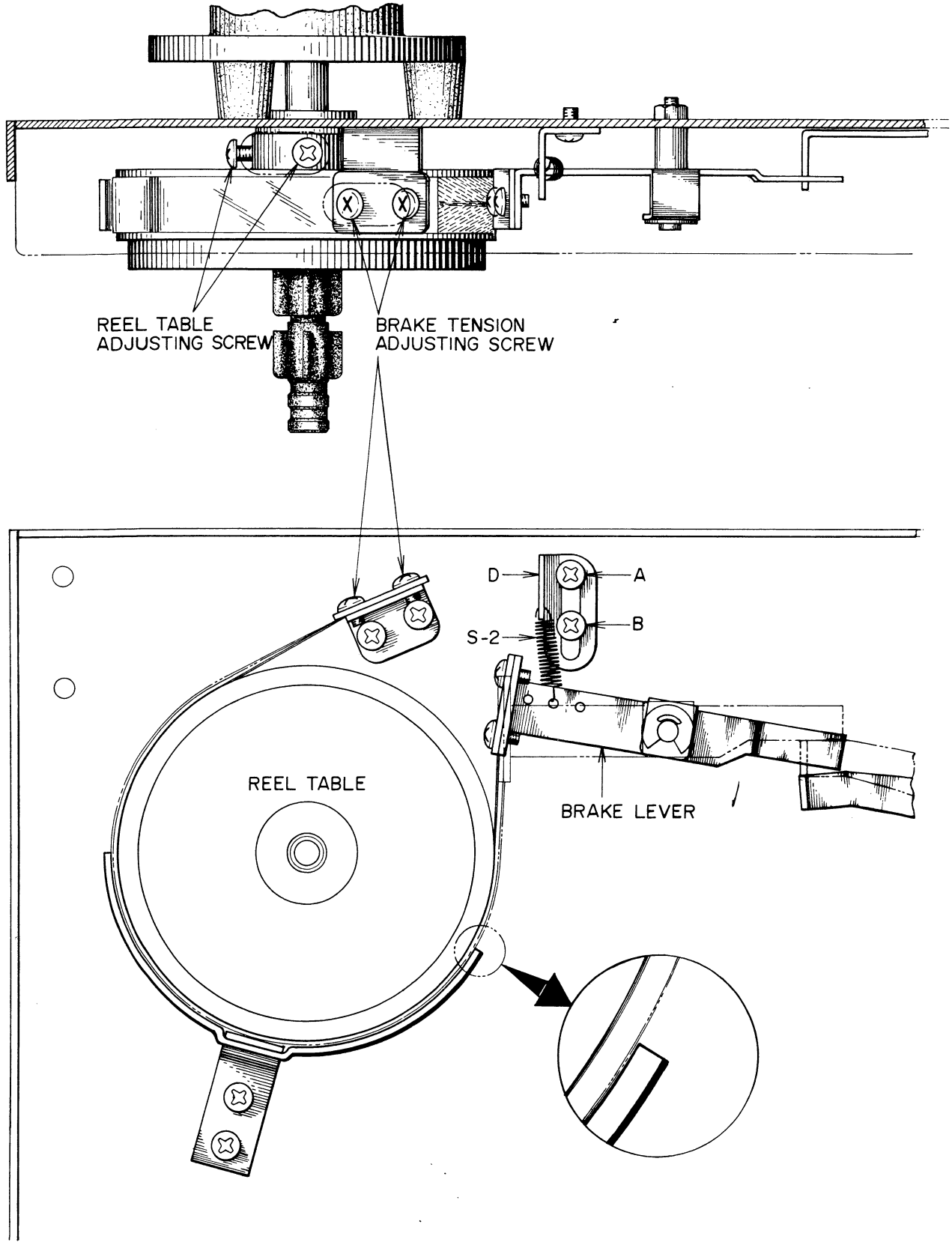


Fig. 6-4

VII. AMPLIFIER ADJUSTMENT

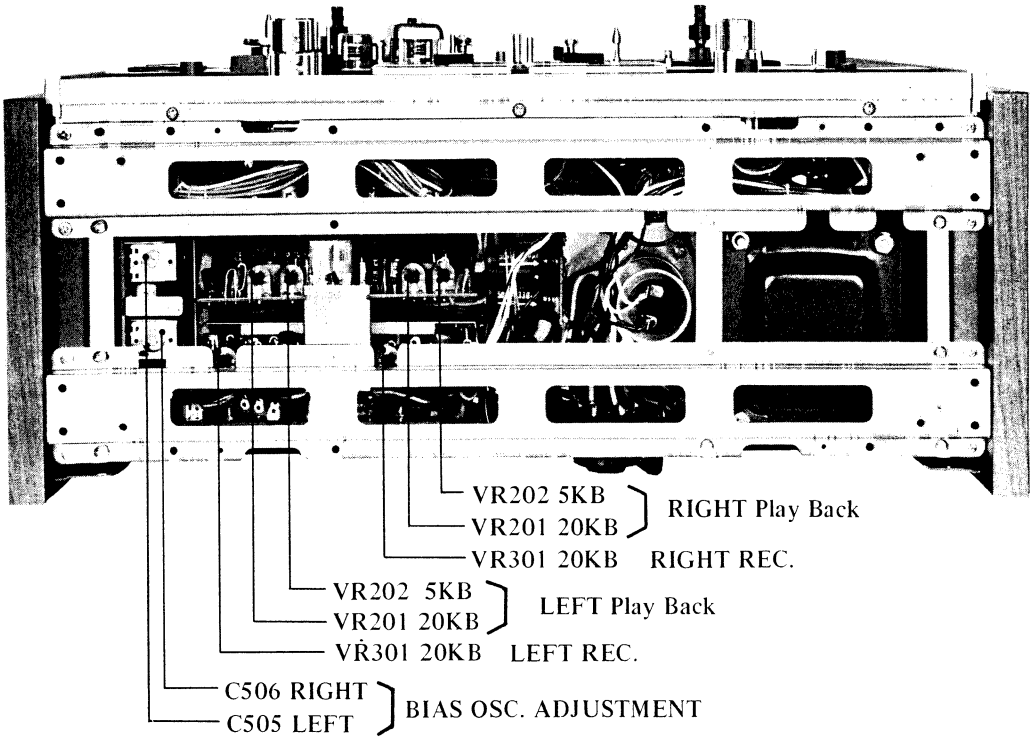


Fig. 7-1

1. PLAYBACK OUTPUT LEVEL (PRE-AMPLIFIER) ADJUSTMENT

a) Connect a high sensitivity V.T.V.M. to the Line Output Jack.
b) Set the Tape Speed Selector Switch to "7-1/2" and set the Monitor Switch to "TAPE" position.
c) Play back a 250 Hz pre-recorded tape.
d) Adjust VR-201 (semi-fixed resistor 20 KB, Fig. 7-1) of the pre-amplifier so that the Line Output Voltage is 1.228 V (+4 dBm).
e) Adjust VR-202 (semi-fixed resistor 5 KB, Fig. 7-1) of the pre-amplifier so that the VU Meter Needle indicates "0" VU (intermediate between red and white).

2. VU METER SENSITIVITY ADJUSTMENT

After the above Playback Output Level Adjustment has been completed, adjust VR-202 (semi-fixed resistor 5 KB) of Playback Print Board (MS-5022) so that the VU Meter indicates exactly "0" VU.

3. ADJUSTMENT OF RECORDING LEVEL

Recording Amplifier Adjustment should be made only after Head Adjustments (Vertical and Horizontal Azimuth) and Playback Amplifier Adjustments have been made.

1) As shown in Fig. 7-2, connect an Audio Oscillator and Attenuator to the Line Input and connect a high sensitivity V.T.V.M. to the Line Output.
2) Load a blank (Fuji S-100) tape.
3) Set Equalizer Switch and Tape Speed Selector to "7-1/2" position and set the Monitor Switch to "TAPE" position.
4) Supply a 1000 Hz signal from the Audio Oscillator to the Line Input.
5) While depressing REC Safety Button, set Playback Lever to "REC" position and record.
6) Adjust the Line Level Control so that the VU Meter Needle indicates "0" VU.
7) Set the Monitor Switch to "SOURCE" position. Adjust VR-301 (semi-fixed resistor 20 KB) of Recording Amplifier Board so that the VU Meter Needle indicates "0" VU.

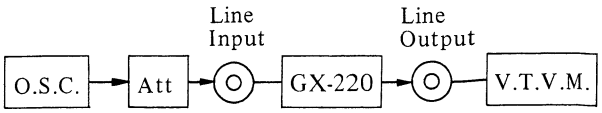


Fig. 7-2

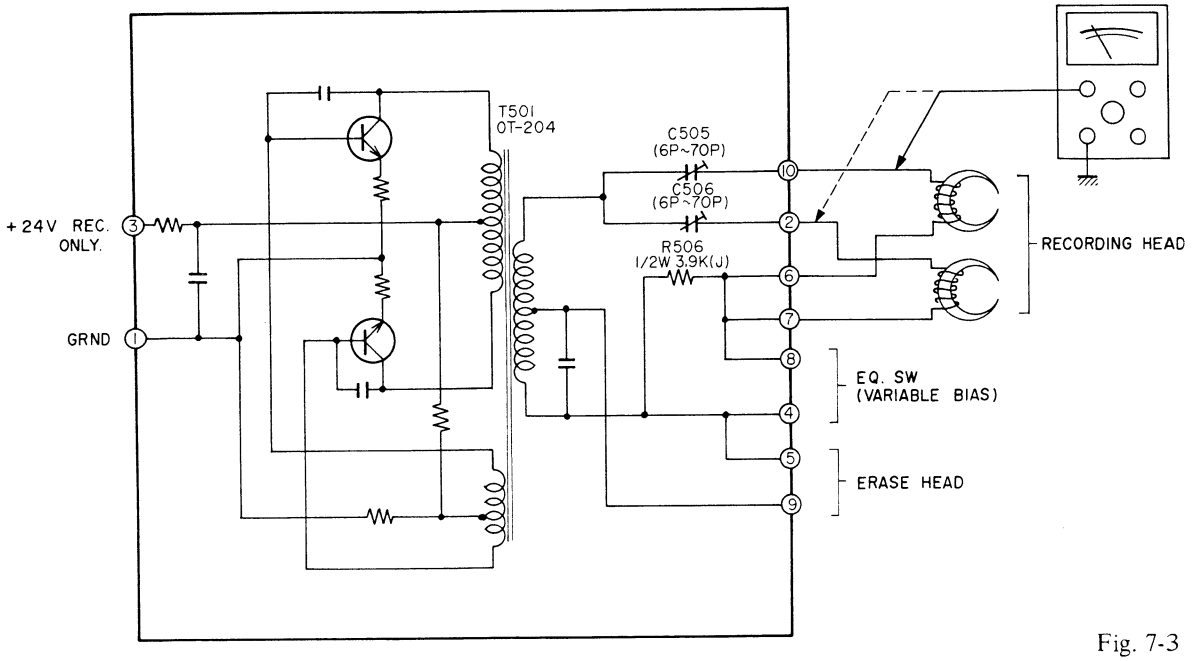


Fig. 7-3

4. ADJUSTMENT OF RECORDING BIAS FREQUENCY AND VOLTAGE

Proper Bias Frequency of the GX-220 (GX-220D) is 100 KC (±5 KC). Proper Bias Voltage is 5 V (+/−2 V). The voltage can be adjusted by turning VC (C-505, C-506) in the Bias Oscillator Circuit.
Erasing Voltage is about 30 V.
Caution :
Always be sure to demagnetize the heads following the above adjustments.

VIII. MAINTENANCE PROCEDURE

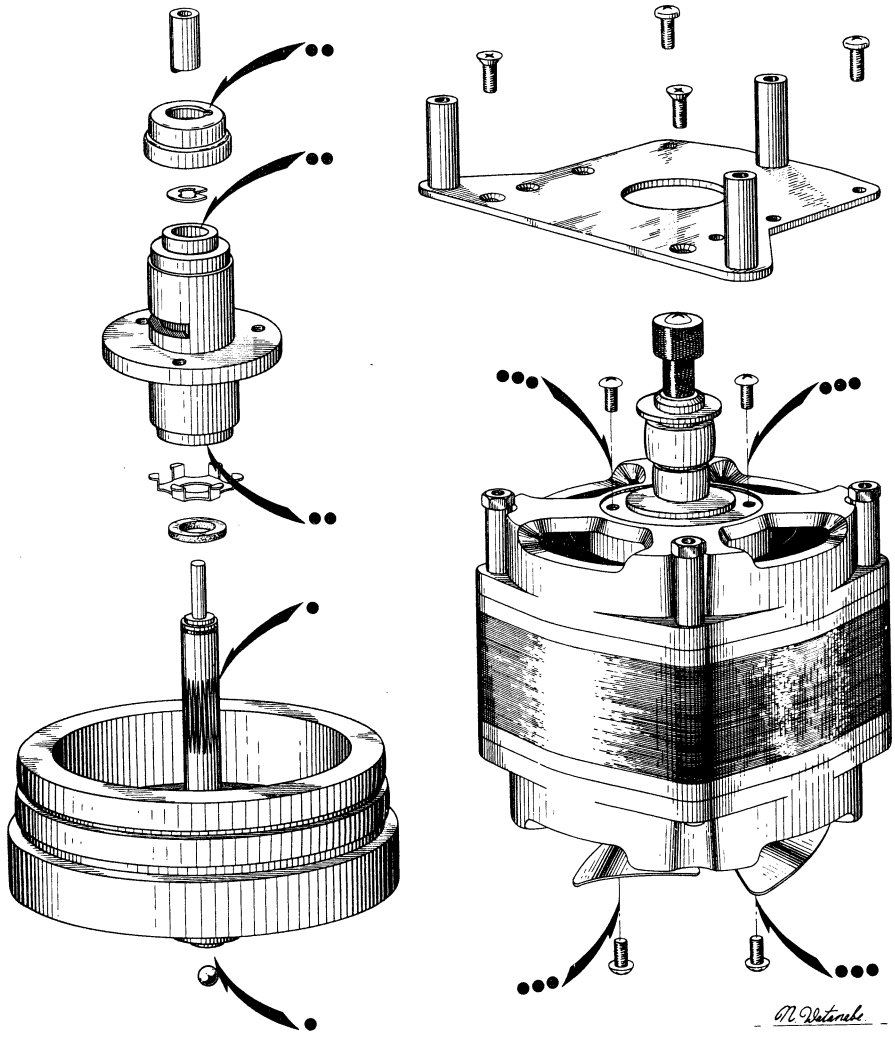
1. LUBRICATION INSTRUCTION

For maximum service life and optimum performance, lubricate the parts identified below after each 500 hours of operation. Use only light machine oil of good quality.

Motor
Flywheel Assembly
Pinch Wheel . . . . . 1 drop

Also apply a liberal film of light machine grease to each roller surface of all levers and cams.

CAUTION : DO NOT OVER-LUBRICATE. WIPE OFF EXCESS OIL WITH A COTTON SWAB SOAKED IN ALCOHOL. OTHERWISE, THE EXCESS LUBRICANT MAY BE SCATTERED DURING OPERATION AND THE RUBBER COMPONENT PARTS WILL DETERIORATE.

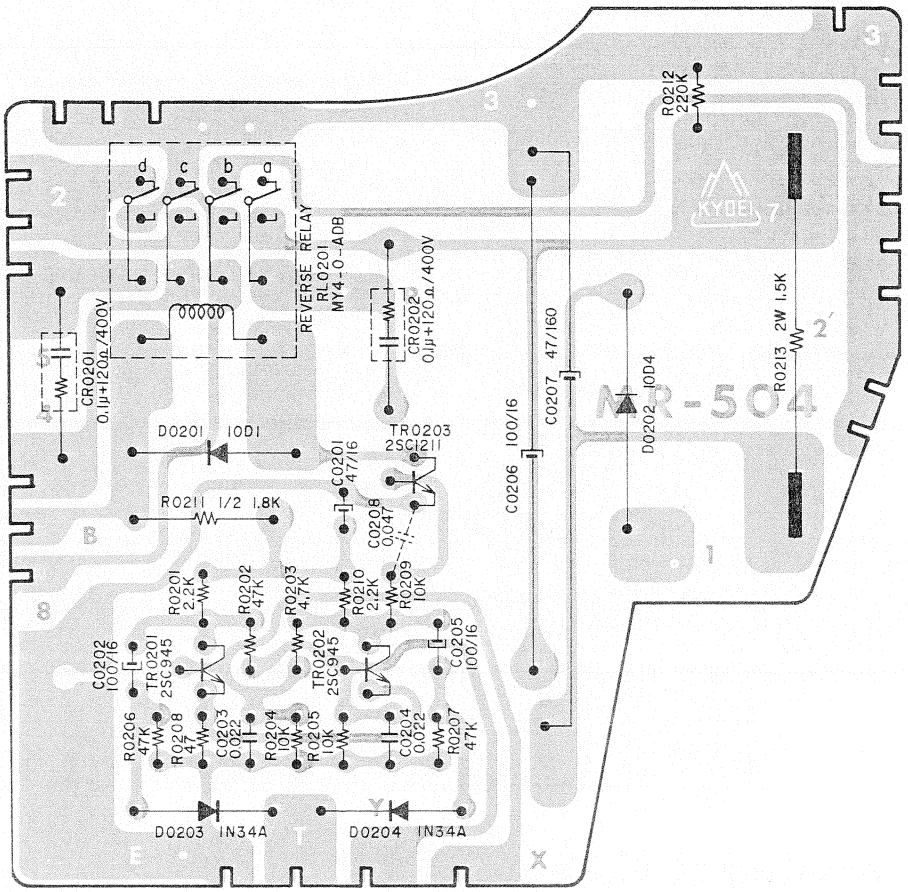


2. CLEANING TAPE HEADS AND OTHER PARTS

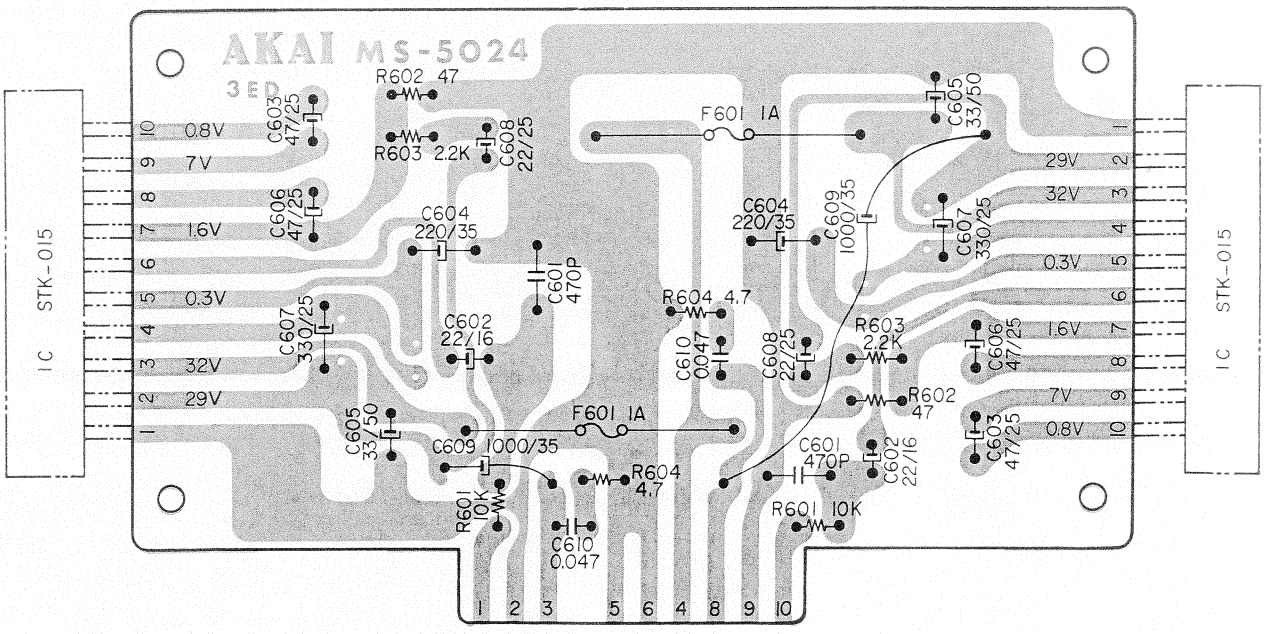
Wipe surface of tape heads, guide roller bearing, capstan bushing and pinch wheel periodically with a soft cloth soaked in alcohol.

IX. COMPOSITE VIEWS OF COMPONENTS

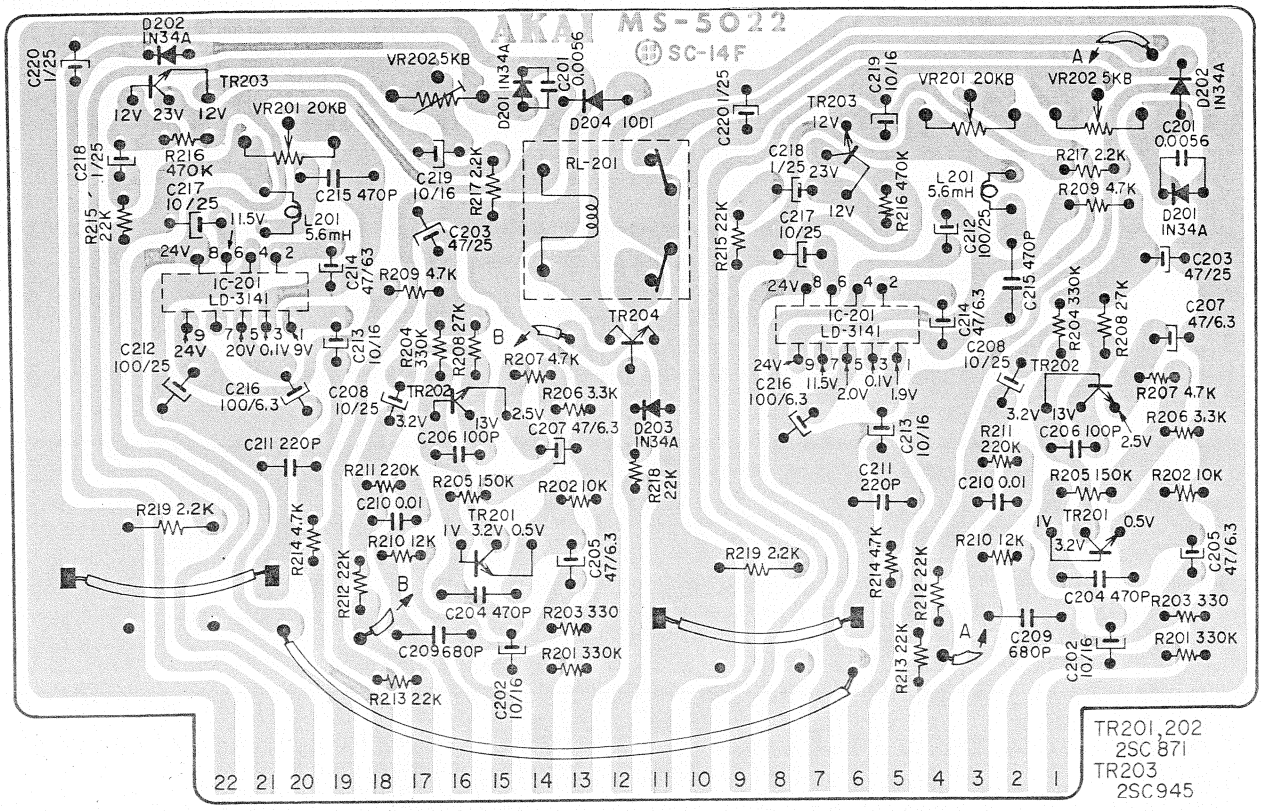
SYSTEM CONTROL P.C. BOARD (MR-504)



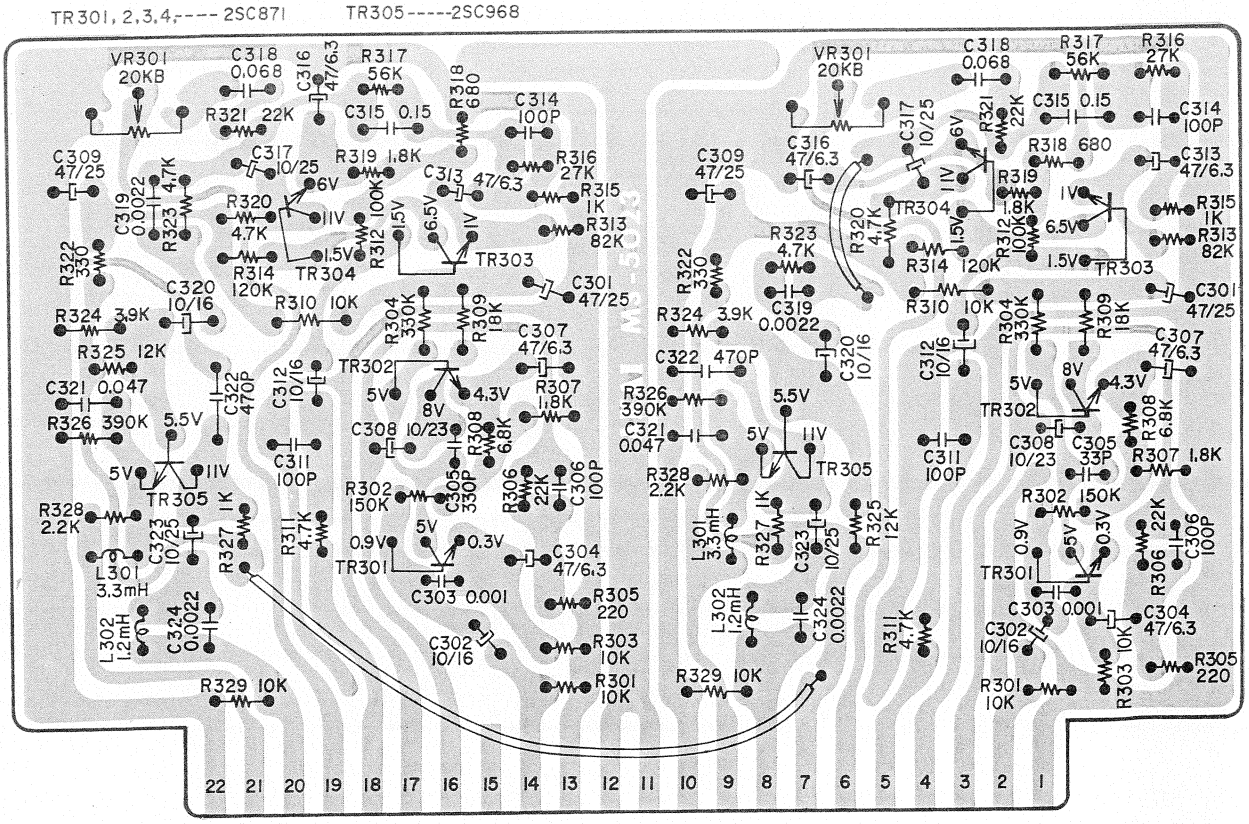
MAIN AMP. P.C. BOARD CMS-5024)



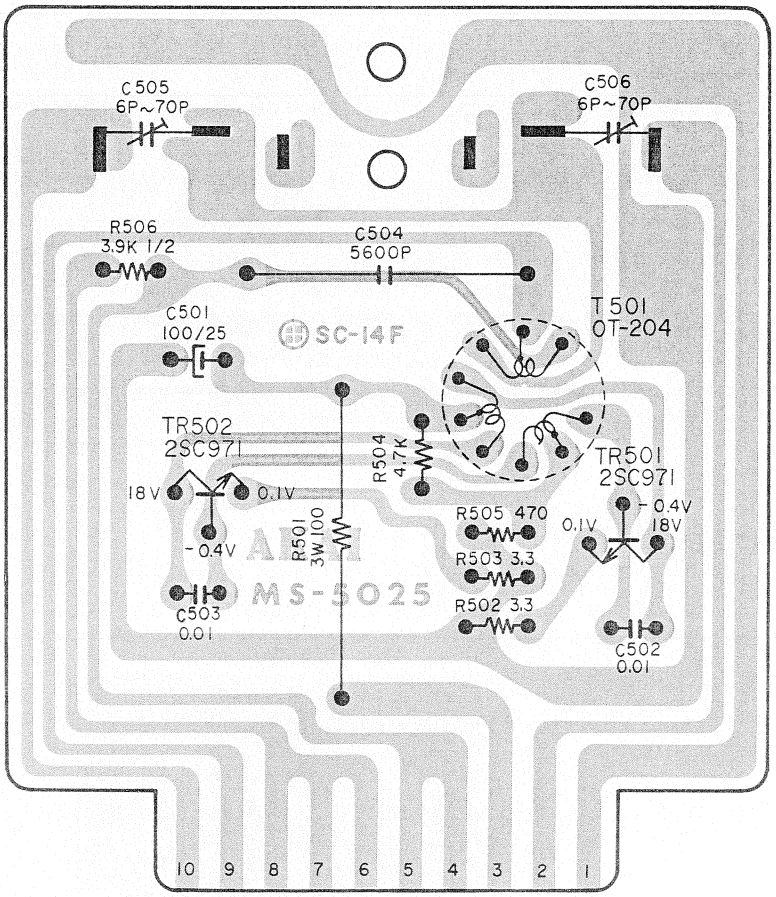
PLAYBACK AMP. P.C. BOARD (MS-5022)



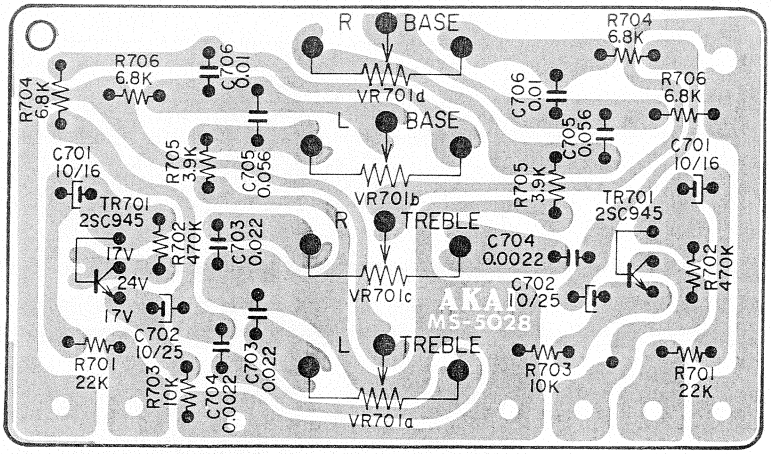
RECORDING AMP. P.C. BOARD (MS-5023)



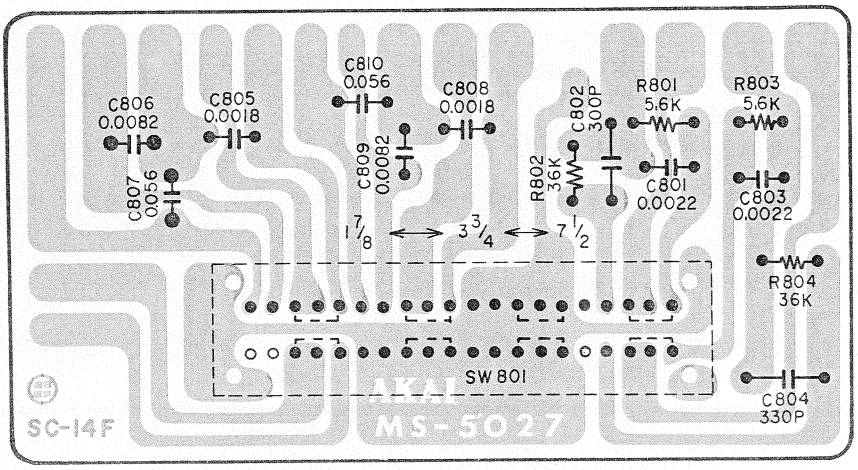
OSCILLATOR P.C. BOARD (MS-5025)



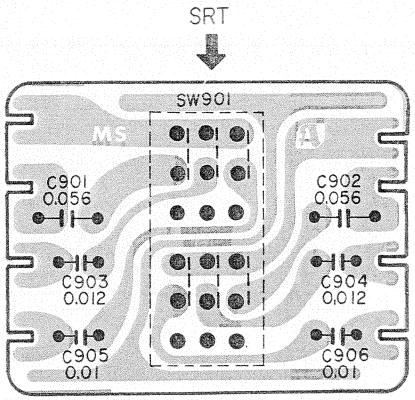
TONE CONTROL P.C. BOARD (MS-5028)



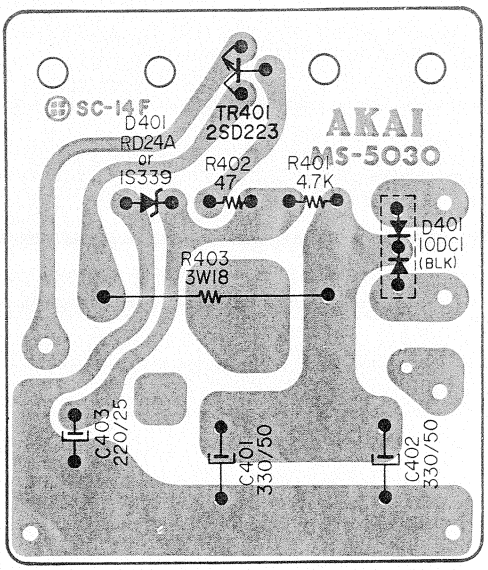
EQUALIZER P.C. BOARD (MS-5027)



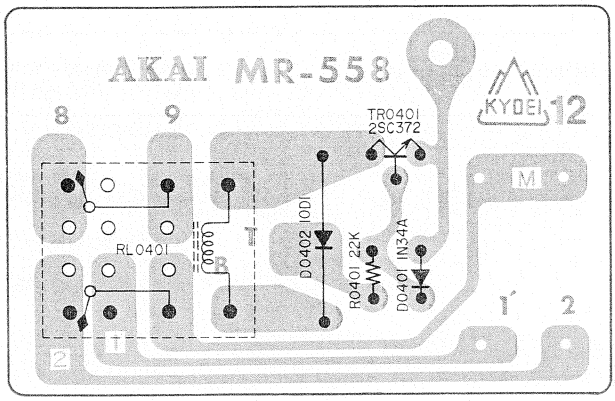
SRT. P.C. BOARD (MS-5029)



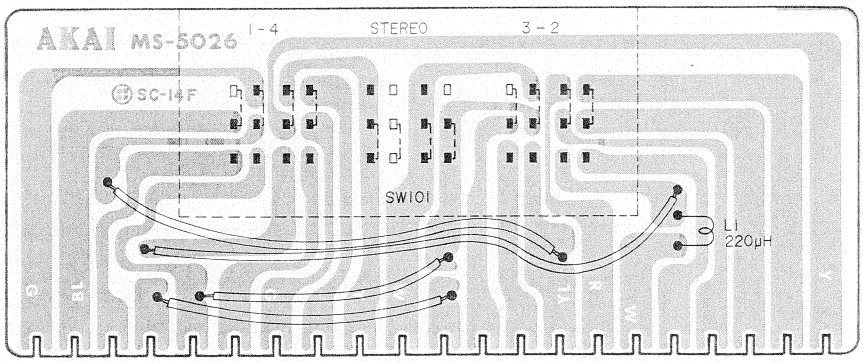
POWERSOURCE P.C. BOARD (MS-5030)



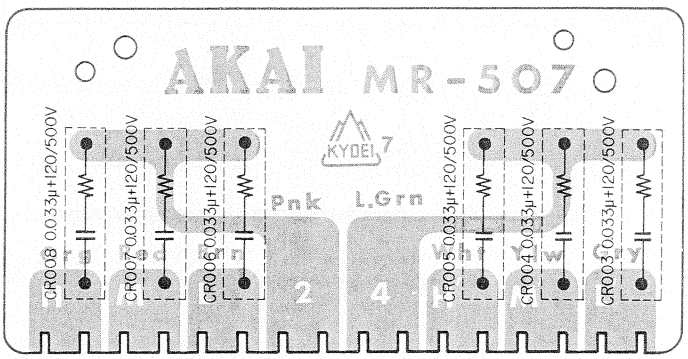
TENSION RELAY P.C. BOARD (MR-558)



TRACK SELECTOR P.C. BOARD (MS-5026)

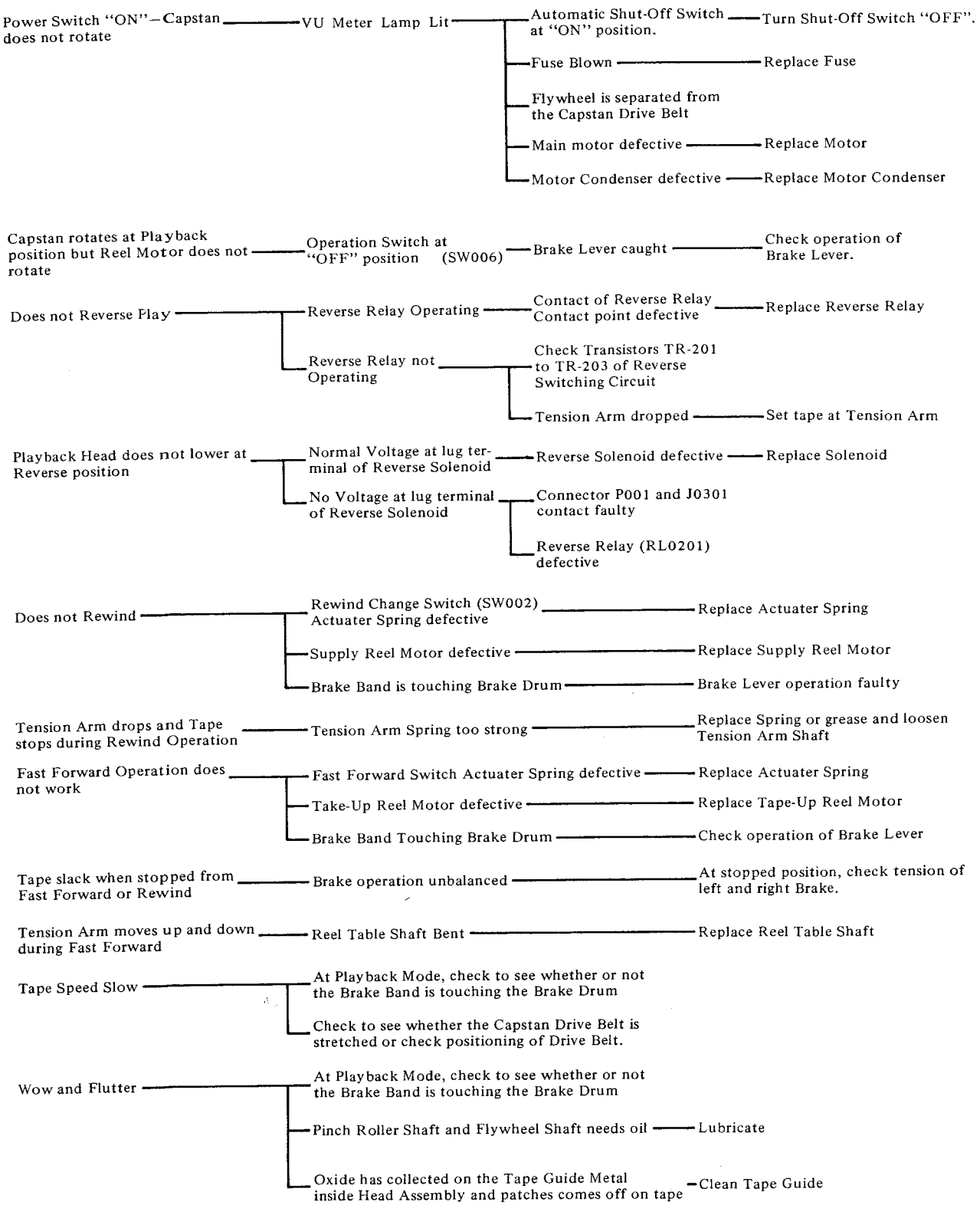


SPARK QUENCHER P.C. BOARD (MR-507)



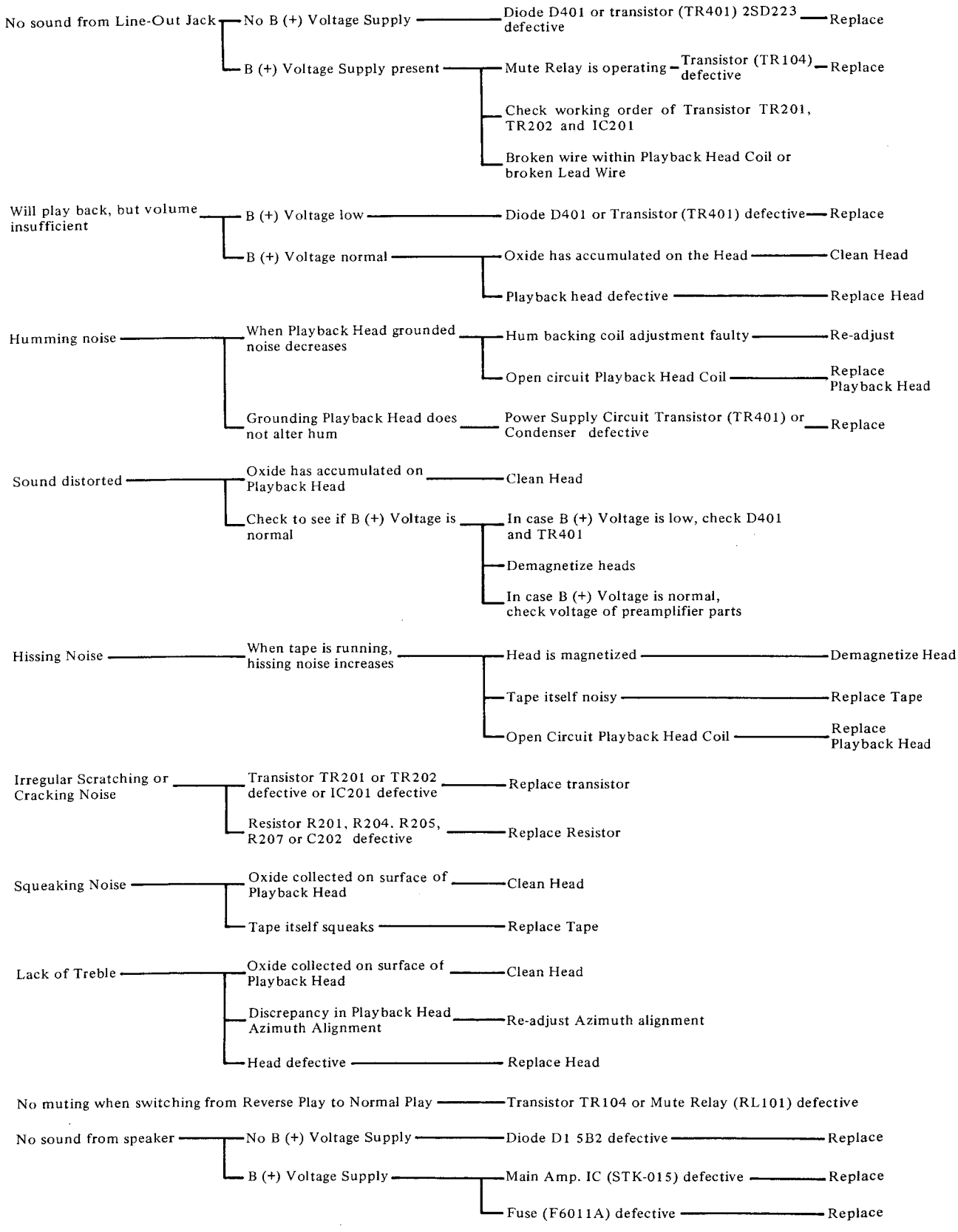
X. TROUBLE SHOOTING CHART

SECTION "A" TROUBLE WITH TAPE TRANSPORT MECHANISM

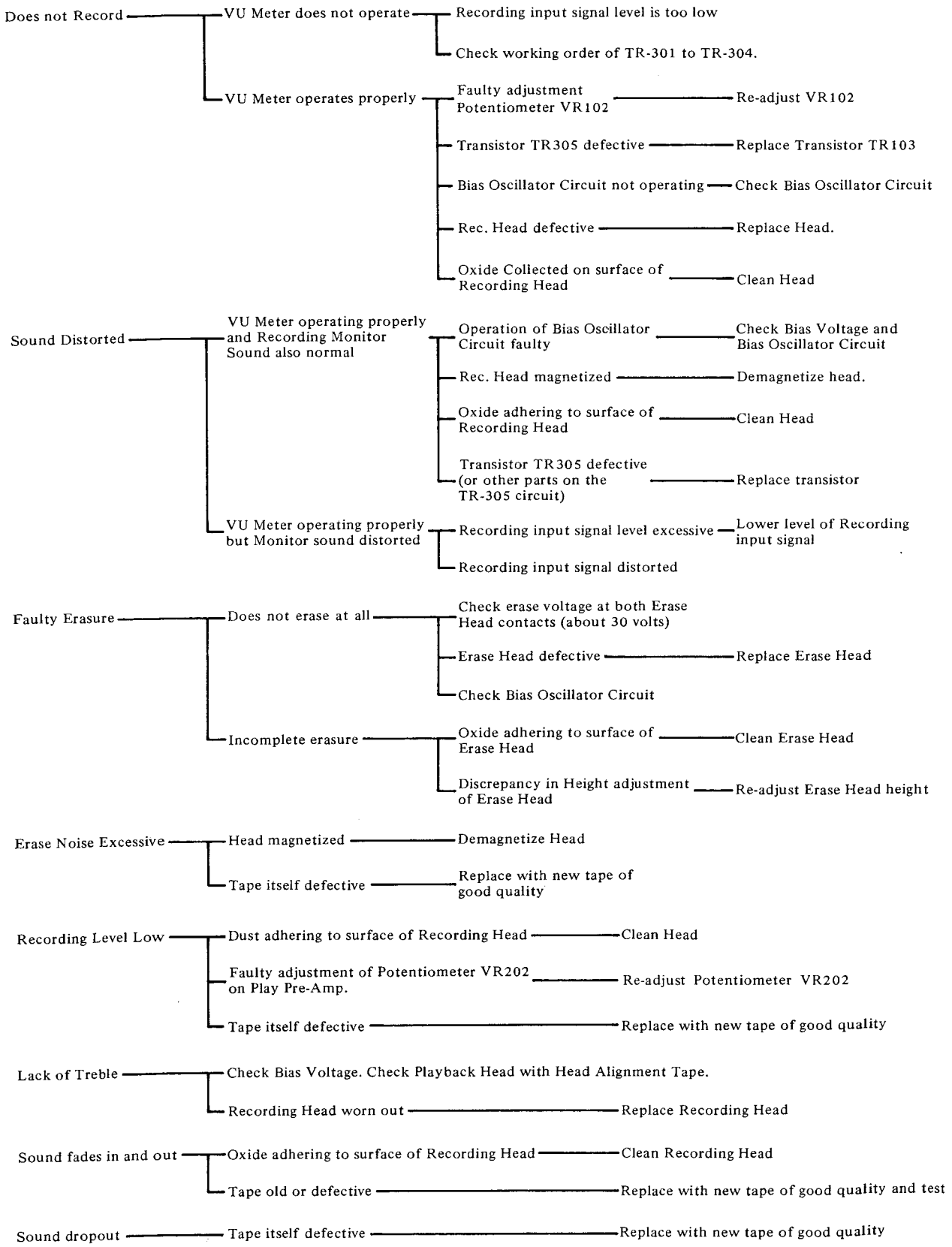

Power Switch "ON"—Capstan does not rotate
VU Meter Lamp Lit
Automatic Shut-Off Switch at "ON" position.
Turn Shut-Off Switch "OFF".
Fuse Blown
Replace Fuse
Flywheel is separated from the Capstan Drive Belt
Main motor defective
Replace Motor
Motor Condenser defective
Replace Motor Condenser
Capstan rotates at Playback position but Reel Motor does not rotate
Operation Switch at "OFF" position (SW006)
Brake Lever caught
Check operation of Brake Lever.
Does not Reverse Play
Reverse Relay Operating
Contact of Reverse Relay Contact point defective
Replace Reverse Relay
Reverse Relay not Operating
Check Transistors TR-201 to TR-203 of Reverse Switching Circuit
Tension Arm dropped
Set tape at Tension Arm
Playback Head does not lower at Reverse position
Normal Voltage at lug terminal of Reverse Solenoid
Reverse Solenoid defective
Replace Solenoid
No Voltage at lug terminal of Reverse Solenoid
Connector P001 and J0301 contact faulty
Reverse Relay (RL0201) defective
Does not Rewind
Rewind Change Switch (SW002) Actuater Spring defective
Replace Actuater Spring
Supply Reel Motor defective
Replace Supply Reel Motor
Brake Band is touching Brake Drum
Brake Lever operation faulty
Tension Arm drops and Tape stops during Rewind Operation
Tension Arm Spring too strong
Replace Spring or grease and loosen Tension Arm Shaft
Fast Forward Operation does not work
Fast Forward Switch Actuater Spring defective
Replace Actuater Spring
Take-Up Reel Motor defective
Replace Tape-Up Reel Motor
Brake Band Touching Brake Drum
Check operation of Brake Lever
Tape slack when stopped from Fast Forward or Rewind
Brake operation unbalanced
At stopped position, check tension of left and right Brake.
Tension Arm moves up and down during Fast Forward
Reel Table Shaft Bent
Replace Reel Table Shaft
Tape Speed Slow
At Playback Mode, check to see whether or not the Brake Band is touching the Brake Drum
Check to see whether the Capstan Drive Belt is stretched or check positioning of Drive Belt.
Wow and Flutter
At Playback Mode, check to see whether or not the Brake Band is touching the Brake Drum
Pinch Roller Shaft and Flywheel Shaft needs oil
Lubricate
Oxide has collected on the Tape Guide Metal inside Head Assembly and patches comes off on tape
Clean Tape Guide

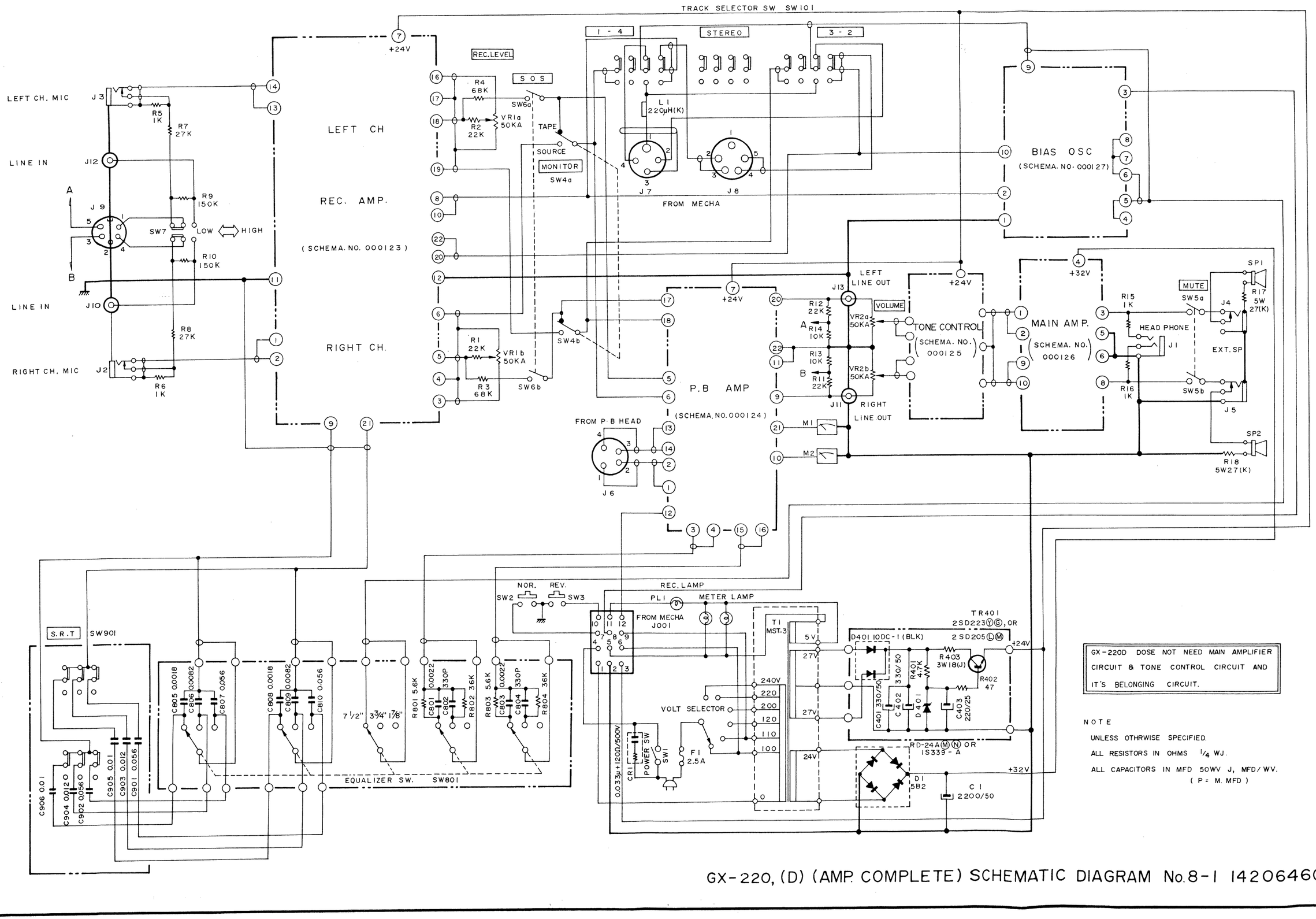
SECTION "B" TROUBLE WITH AMPLIFIER

1. Playback Mode


No sound from Line-Out Jack
No B (+) Voltage Supply
Diode D401 or transistor (TR401) 2SD223 defective
Replace
B (+) Voltage Supply present
Mute Relay is operating
Transistor (TR104) defective
Replace
Check working order of Transistor TR201, TR202 and IC201
Broken wire within Playback Head Coil or broken Lead Wire
Will play back, but volume insufficient
B (+) Voltage low
Diode D401 or Transistor (TR401) defective
Replace
B (+) Voltage normal
Oxide has accumulated on the Head
Clean Head
Playback head defective
Replace Head
Humming noise
When Playback Head grounded noise decreases
Hum backing coil adjustment faulty
Re-adjust
Open circuit Playback Head Coil
Replace Playback Head
Grounding Playback Head does not alter hum
Power Supply Circuit Transistor (TR401) or Condenser defective
Replace
Sound distorted
Oxide has accumulated on Playback Head
Clean Head
Check to see if B (+) Voltage is normal
In case B (+) Voltage is low, check D401 and TR401
Demagnetize heads
In case B (+) Voltage is normal, check voltage of preamplifier parts
Hissing Noise
When tape is running, hissing noise increases
Head is magnetized
Demagnetize Head
Tape itself noisy
Replace Tape
Open Circuit Playback Head Coil
Replace Playback Head
Irregular Scratching or Cracking Noise
Transistor TR201 or TR202 defective or IC201 defective
Replace transistor
Resistor R201, R204. R205, R207 or C202 defective
Replace Resistor
Squeaking Noise
Oxide collected on surface of Playback Head
Clean Head
Tape itself squeaks
Replace Tape
Lack of Treble
Oxide collected on surface of Playback Head
Clean Head
Discrepancy in Playback Head Azimuth Alignment
Re-adjust Azimuth alignment
Head defective
Replace Head
No muting when switching from Reverse Play to Normal Play
Transistor TR104 or Mute Relay (RL101) defective
No sound from speaker
No B (+) Voltage Supply
Diode D1 5B2 defective
Replace
B (+) Voltage Supply
Main Amp. IC (STK-015) defective
Replace
Fuse (F6011A) defective
Replace

2. Recording Mode


Does not Record
VU Meter does not operate
Recording input signal level is too low
Check working order of TR-301 to TR-304.
VU Meter operates properly
Faulty adjustment Potentiometer VR102
Re-adjust VR102
Transistor TR305 defective
Replace Transistor TR103
Bias Oscillator Circuit not operating
Check Bias Oscillator Circuit
Rec. Head defective
Replace Head.
Oxide Collected on surface of Recording Head
Clean Head
Sound Distorted
VU Meter operating properly and Recording Monitor Sound also normal
Operation of Bias Oscillator Circuit faulty
Check Bias Voltage and Bias Oscillator Circuit
Rec. Head magnetized
Demagnetize head.
Oxide adhering to surface of Recording Head
Clean Head
Transistor TR305 defective (or other parts on the TR-305 circuit)
Replace transistor
VU Meter operating properly but Monitor sound distorted
Recording input signal level excessive
Lower level of Recording input signal
Recording input signal distorted
Faulty Erasure
Does not erase at all
Check erase voltage at both Erase Head contacts (about 30 volts)
Erase Head defective
Replace Erase Head
Check Bias Oscillator Circuit
Incomplete erasure
Oxide adhering to surface of Erase Head
Clean Erase Head
Discrepancy in Height adjustment of Erase Head
Re-adjust Erase Head height
Erase Noise Excessive
Head magnetized
Demagnetize Head
Tape itself defective
Replace with new tape of good quality
Recording Level Low
Dust adhering to surface of Recording Head
Clean Head
Faulty adjustment of Potentiometer VR202 on Play Pre-Amp.
Re-adjust Potentiometer VR202
Tape itself defective
Replace with new tape of good quality
Lack of Treble
Check Bias Voltage. Check Playback Head with Head Alignment Tape.
Recording Head worn out
Replace Recording Head
Sound fades in and out
Oxide adhering to surface of Recording Head
Clean Recording Head
Tape old or defective
Replace with new tape of good quality and test
Sound dropout
Tape itself defective
Replace with new tape of good quality



GX-220D DOSE NOT NEED MAIN AMPLIFIER CIRCUIT & TONE CONTROL CIRCUIT AND IT'S BELONGING CIRCUIT.

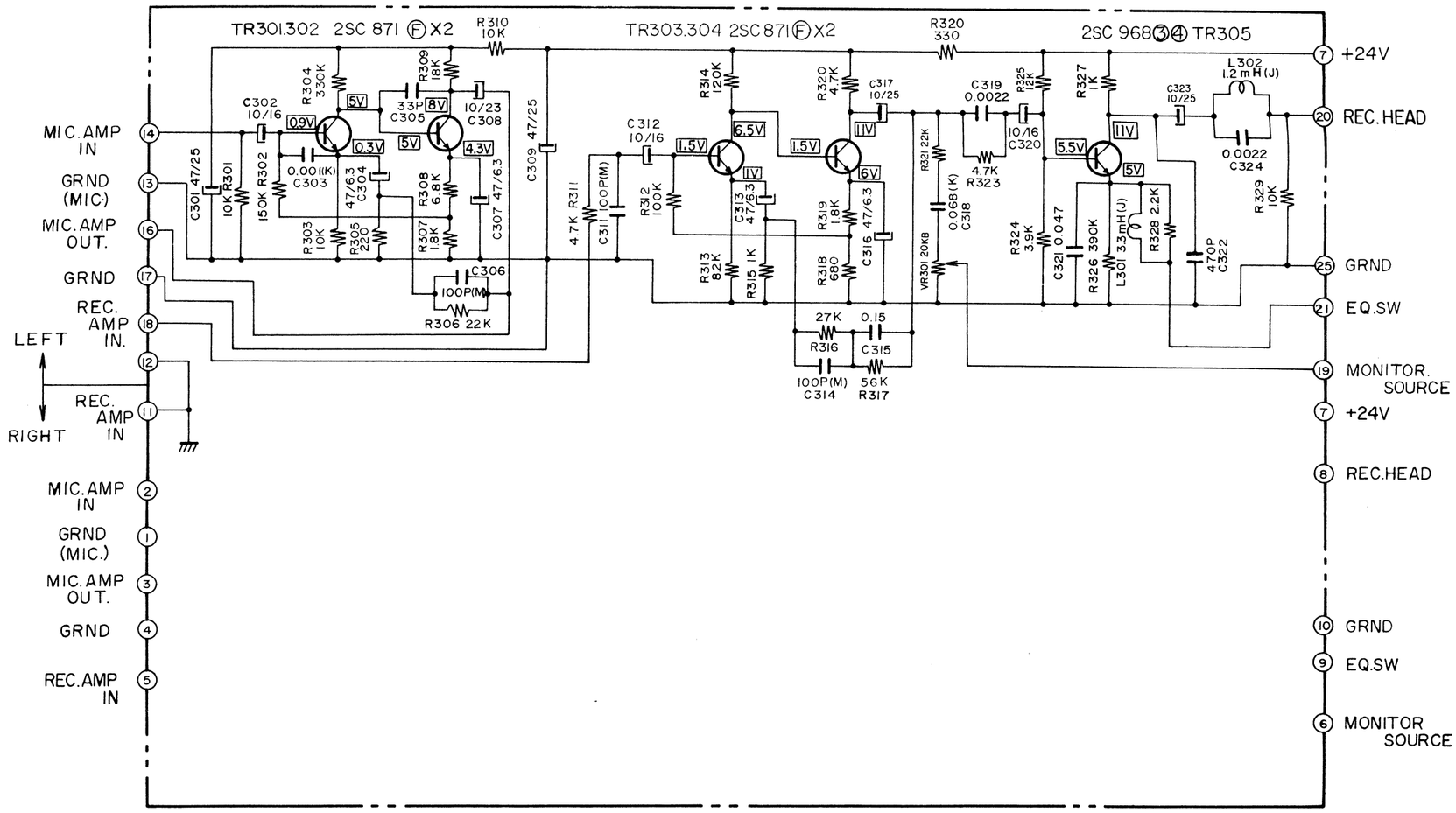
NOTE

UNLESS OTHRWISE SPECIFIED.

ALL RESISTORS IN OHMS 1/4 WJ.

ALL CAPACITORS IN MFD 50WV J, MFD/WV. (P = M. MFD)

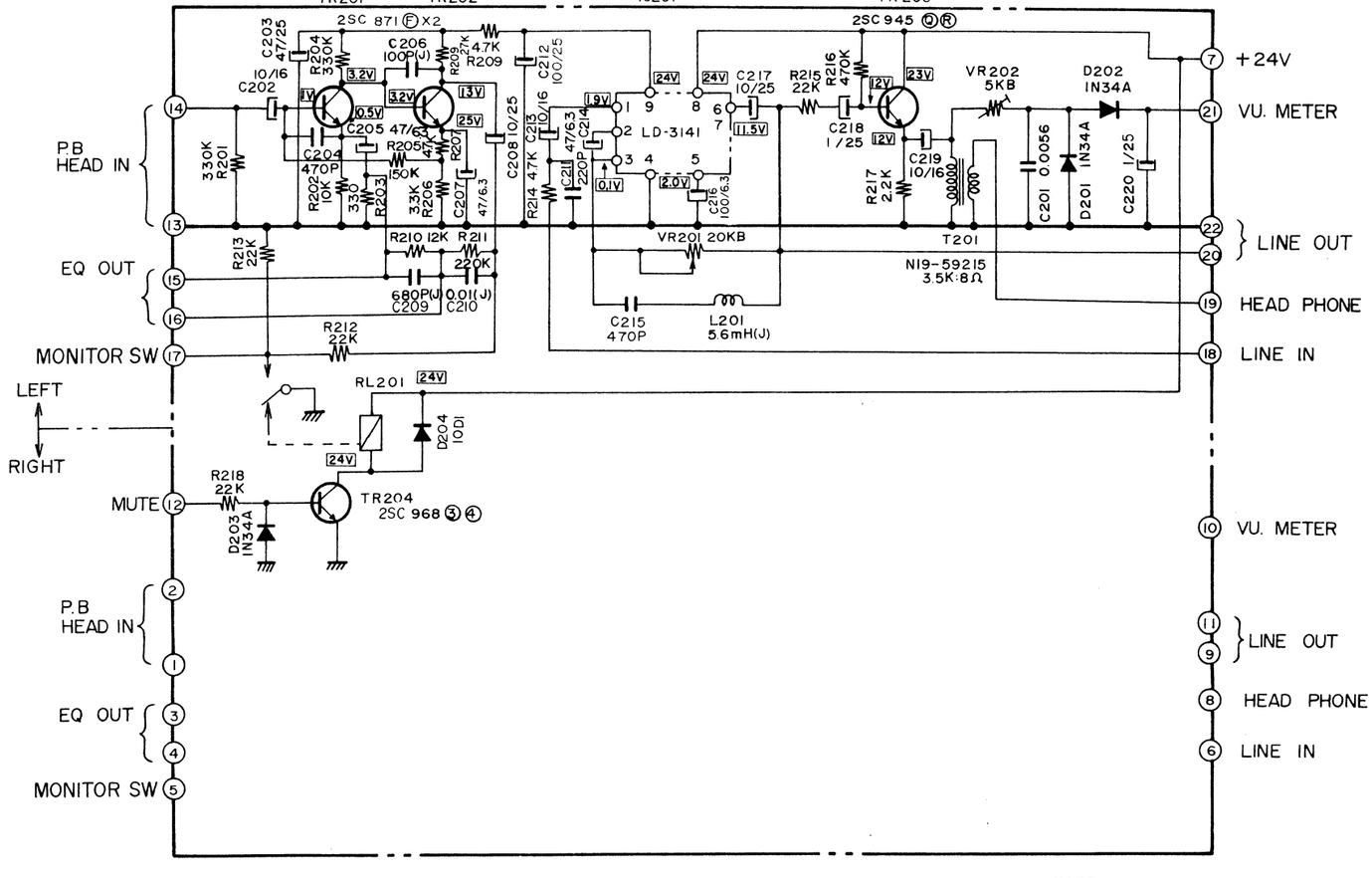
GX-220, (D) (AMP. COMPLETE) SCHEMATIC DIAGRAM No.8-I 14206460



NOTE

UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4 WJ
CAPACITORS IN MFD(J) 150WV. MFD/WV
(P=M·MFD)

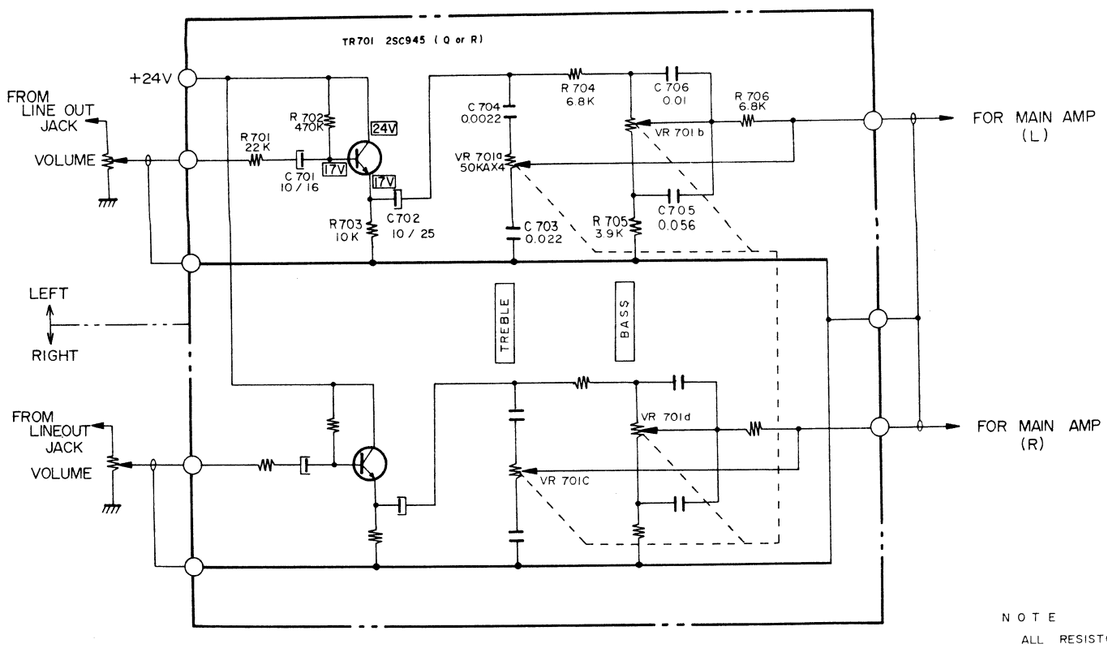
GX-220,(D) (REC AMP) SCHEMATIC DIAGRAM No.8-2 14206480



NOTE.

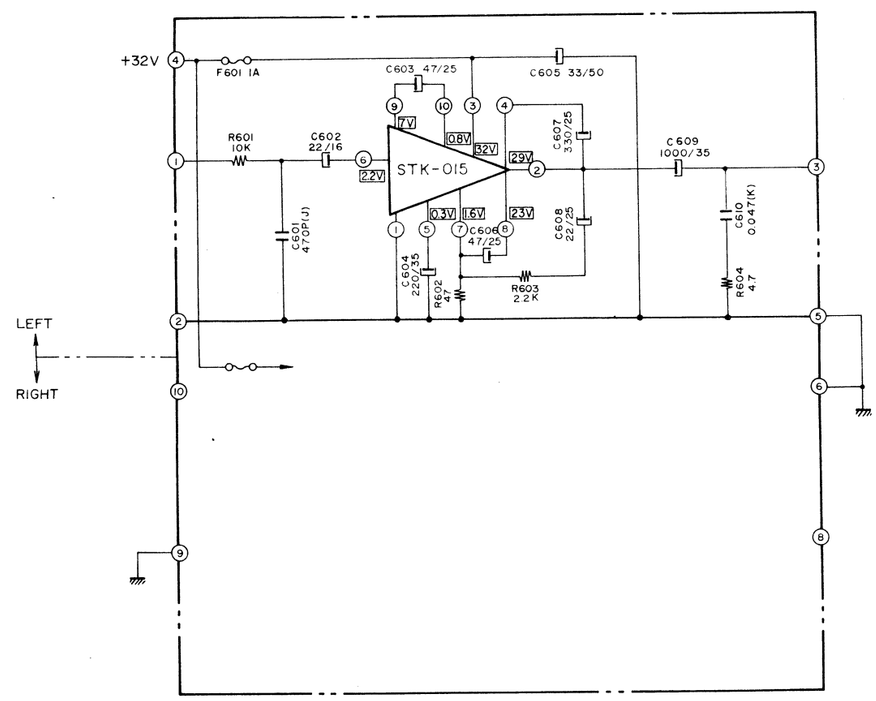
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4WJ
CAPACITORS IN MFD(K)/50WV. MFD/WV
(P=M·MFD.)

GX-220, (D) (P.B AMP) SCHEMATIC DIAGRAM No.8-3 14206500



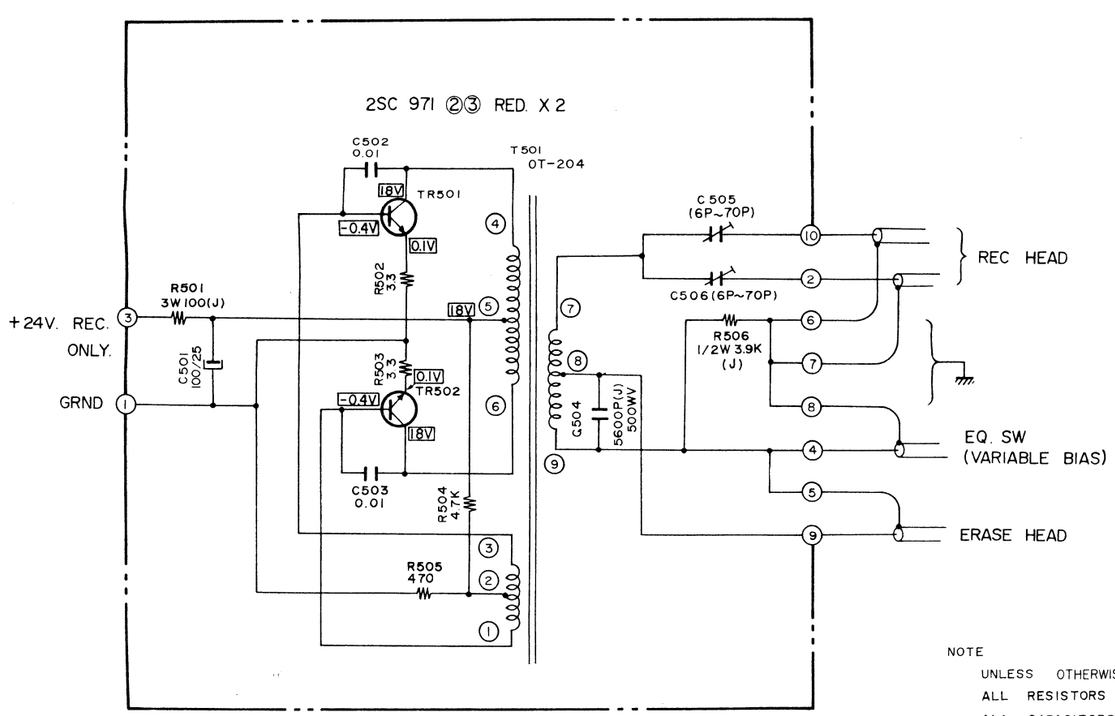
NOTE
ALL RESISTORS IN OHMS 1/4 W J
ALL CAPACITORS IN MFD(J)/50WV MFD/WV

GX-220 (TONE. CONTROL) SCHEMATIC DIAGRAM No.8-4 14206520



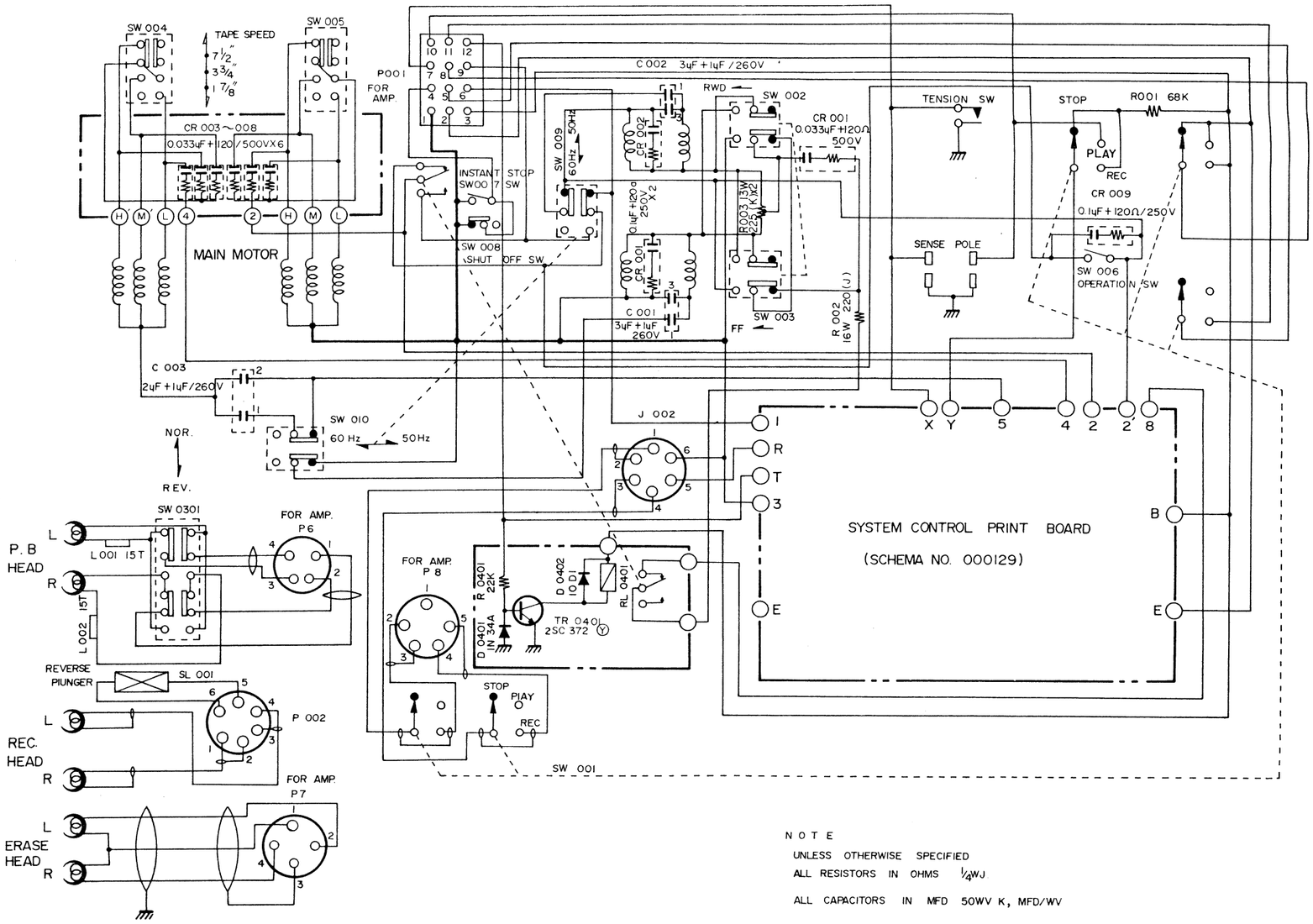
NOTE
ALL RESISTORS IN OHMS 1/4 W J.
ALL CAPACITORS IN MFD/50WV MFD/WV
(P=M·MFD.)

GX-220 (MAIN. AMP.) SCHEMATIC DIAGRAM No.8-5. 14206540



NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4 W J
ALL CAPACITORS IN MFD(J)/50WV MFD/WV
(P=M·MFD)

GX-220,(D) (BIAS O.S.C.) SCHEMATIC DIAGRAM. No.8-6 14206560



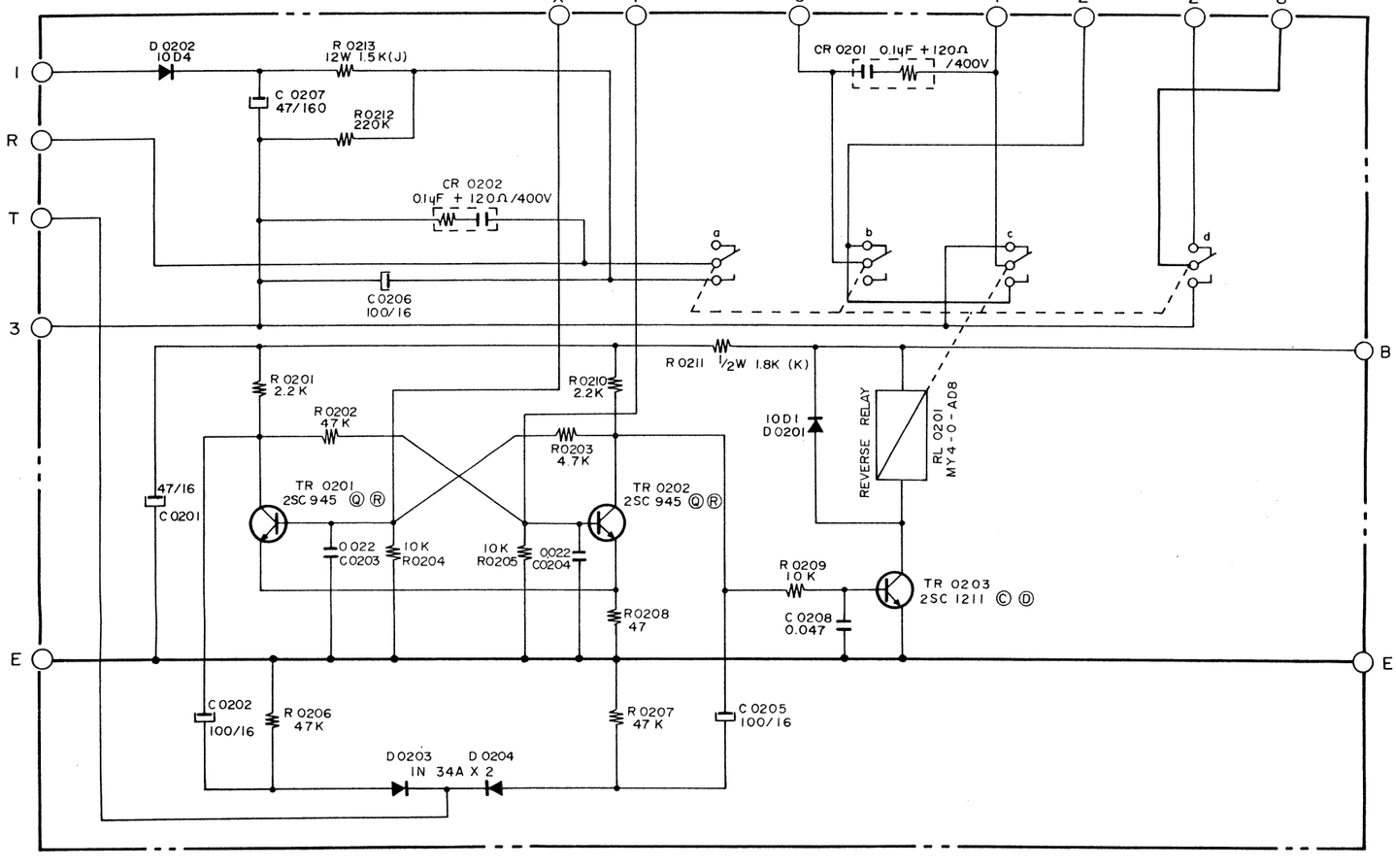
NOTE

UNLESS OTHERWISE SPECIFIED

ALL RESISTORS IN OHMS 1/4WJ

ALL CAPACITORS IN MFD 50WV K, MFD/WV

GX-220,(D)(MECHANISM) SCHEMATIC DIAGRAM No.8-7 14203580



NOTE

UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS IN OHMS 1/4 W J.

ALL CAPACITORS IN MFD 50WV K, MFD/WV

(P = M·MFD)

GX-220,(D) (SYSTEM CONTROL) SCHEMATIC DIAGRAM. No.8-8 14206600